

REPORT OF THE COMMITTEE ON AUTOMATION



GOVERNMENT OF INDIA
MINISTRY OF LABOUR AND REHABILITATION

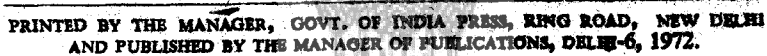
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COMMITTEE ON AUTOMATION

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Shri Ram Desai

Shri Satish Loomba

Shri B. D. Somani

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Shri Naval H. Tata

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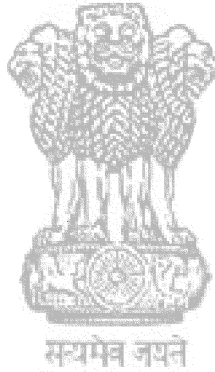
SECRETARY

Shri M. A. M. Rao

REPORT SIGNED ON : 18-5-1972

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CHAPTER 1

INTRODUCTORY

Since the dawn of Industrial Revolution technological changes have swept the world and modern scientific and improved methods of production have replaced the older machines and methods. The latest of these technological changes are based on automation and computerised control, opening a vista of possibilities far beyond the dreams of the last century. Yet few subjects have sparked off such a controversy as automation. For some, it is the harbinger of an age of plenty and progress—a development which opens up vistas of greater productivity and higher standards of living. Some others have viewed it as an unmitigated curse which would deprive man of his employment and functions and ultimately dehumanise him, making him a slave of the machine.

1.1. India has been a rather late starter in the field of automation, but the controversy has been no less intense here also. The present controversy over automation recalls in some respects the earlier controversy over 'Rationalisation', which had exercised the minds of Government, employers and trade union for quite some time. Since the end of World War II, there has been a growing demand that in order to keep pace with developments elsewhere, Indian industries have to introduce a measure of rationalisation. Indian labour has had certain reservations in regard to rationalisation in view of its impact on employment and the distribution of the resultant gains and has urged that rationalisation of the organisational and managerial sides should be first explored.

1.2. The issue of rationalisation was discussed at several tripartite conferences and finally the 'Model Agreement' to regulate rationalisation was adopted at the 15th Session of the Indian Labour Conference (July, 1957). It was emphasised and agreed that Government might make arrangements to ensure that measures of rationalisation which did not serve real economic interest in the existing conditions of the country might be avoided. The agreement laid down among other things:—

“(i) there should be no retrenchment or loss of earnings of the existing employees, i.e., the full complement

required for the operations before rationalisation should be maintained except for cases of natural separation or wastage. Workers could, however, be provided with suitable alternative jobs in the same establishment or under the same employer, subject to agreement between the employer and his workers;

- (ii) there should be an equitable sharing of benefits of rationalisation as between the community, the employer and the worker ; and
- (iii) there should be a proper assessment of workload made by an expert or experts mutually agreed upon and also suitable improvement in the working conditions."

The Agreement specifically provided for prior consultation with the unions before the installation of rationalised equipment.

1.3. Advanced technology ranging from automatic machinery to electronic computers came to be introduced in the Indian economy during the sixties. Apart from the introduction of automatic equipment as a part of the modernisation of industries like cotton and jute textiles, automation including computers was adopted to a steadily increasing degree in educational and scientific research, tele-communications, transport, defence, and modern industries like petroleum, fertilizers and chemicals, steel and aircraft manufacture, and in business and administration. While automation in new process industries and in manufacturing did not arouse much opposition, the introduction of computers, particularly for office work, evoked serious misgivings among the employees.

1.4. The issue attracted all India attention because of the unilateral decision of the Life Insurance Corporation (LIC) management in 1963 to introduce a computer. The All India Insurance Employees' Association started an agitation against the proposal and the general issue of automation was taken up by the central trade union organisations. The trade unions have viewed automation as a painful luxury, and as a labour saving device which has no place in a developing economy marked by labour surpluses and scarce capital resources. It is also opposed on the ground that it results in loss of employment—existing as well as potential—which according to them is inherent in any scheme of automation and cannot be taken care of by any degree of social pressures. Further, they feel that use of computers for routine office jobs would be a misuse

of a costly technical tool. The employers, on the other hand, have maintained that automation is only an advanced stage in the normal process of mechanisation and will not result in any serious harmful social consequences at the unit level that cannot be taken care of. Its use is indispensable for accelerating industrialisation, maximising production and raising standards of living of the masses. They have argued that certain activities cannot be undertaken without computerisation which is a versatile tool for better management control and decision making.

Tripartite Deliberations

1.5. In such circumstances the subject of automation was brought for apex level tripartite deliberations on more than one occasion to facilitate better communication between labour and management and help the Government in evolving a suitable policy on automation. For the first time, the subject of automation was discussed at the 24th Session of the Indian Labour Conference (ILC) in July, 1966. "It was generally considered that what was called for was a regulation of the pace of technological change to facilitate a smooth and orderly transition, with the minimum of social costs. It was agreed that the requirements of the Model Agreement on Rationalisation should be fully complied with while introducing 'Automation' also." It was considered that this Agreement would provide the necessary protection to the interests of labour as it contained provision for no retrenchment or loss of earnings of the existing employees, for equitable sharing of the resultant benefits among industry, workers and the community and also prescribed a procedure for introduction of change with prior notice, consultation with workers and for arbitration in cases of failure of negotiations.

1.6. The deliberations at the 24th Session of the ILC did not allay the deep-rooted apprehensions of labour. The subject of automation was again discussed at the 26th Session of the Standing Labour Committee (SLC) held in May, 1967. No specific conclusion could be reached during the discussions. The consensus appeared to be that automation in manufacturing process should be regulated by the Model Agreement on Rationalisation. The issue of automation of clerical work, however, evoked sharp controversies. The labour representatives as also certain State Labour Ministers opposed this type of automation largely because of its restrictive effects on employ-

ment. A suggestion that every proposal for automation in clerical work may be permitted only after screening by a standing tripartite committee to be constituted for the purpose, was not acceptable to the employers' representatives.

1.7. The agitation against computerisation continued. The employees in LIC, Oil Companies and Railways stepped up their opposition to the introduction of computers. The trade union organisations organised conventions against automation in 1966 and 1967 and passed resolutions criticising Government's inaction and demanding an immediate ban on automation in the country. They also urged Government to call a special tripartite conference to discuss exclusively the problem of automation.

1.8. Meanwhile, more computers were being installed. In cases where the computer had to be imported and foreign exchange was involved, the concerned Ministry was required to obtain the clearance of the Ministry of Labour and Employment, before authorising the import of the machine. The Labour Ministry's clearance was based on the assessment and advice of the Chief Labour Commissioner (Central) and the Director, Labour Bureau. For this purpose, the Chief Labour Commissioner (Central) and the Director, Labour Bureau evaluate and report on an application on the basis of relevant information collected about the data processing equipment being already used by the applicant for the computer, number of persons employed by him, items of work proposed to be shifted to computer, consequential effects on existing employment, etc. and discussions with the management concerned and the registered trade unions operating in the establishments. The procedure, however, did not have much impact on the pace of introduction of computers in India. As most of the computers installed were locally assembled and not imported, they did not come within the purview for the screening procedure; and during the years 1967-71 only five proposals for computers were referred to it, although the number of computers introduced during this period was 94.

1.9. The number of computers in the country continued to show an increasing trend; it went up from 30 in 1965 to 88 in 1968. The concern of the trade unions about a definite policy pronouncement by the Government regarding automation in the context of the present stage of economic development and large scale unemployment prevailing in the country was also

growing. Automation of clerical work was particularly resented. The trade unions demanded a special session of the Standing Labour Committee to discuss the subject.

1.10. The Government of India, anxious to bring about a reconciliation of the opposing points of view on the issue of automation and to work out an agreed policy on the subject, convened a special meeting of the Standing Labour Committee on 18th July, 1968 at New Delhi to consider the impact of automation and recommend necessary remedial measures. In order to broaden the scope of discussion and participation, workers' and employers' representatives from organisations like the LIC, State Bank of India, Railways and Oil Companies which had otherwise no direct representation at the SLC were invited to join the deliberations at this Session.

1.11. At this meeting there was a prolonged discussion in the course of which the different parties stated their respective positions with regard to automation. On behalf of the workers' representatives it was stated that, "...since the country had an enormous volume of unemployment and was short of technological and capital resources the general orientation of policy should be against automation. Exceptions could, however, be permitted in special circumstances when there was a compulsion for introducing automation. What constituted such a compulsion and the conditions under which such exceptions might be permissible had to be spelt out in detail. A small Working Group of the Standing Labour Committee might be constituted for laying down the necessary guidelines. Experts might be associated with this Working Group and the guidelines formulated by the Working Group should be placed before the Standing Labour Committee or the Indian Labour Conference for final approval. Pending formulation of such guidelines there should be a freeze on automation. Where it had already been introduced employers should be asked to desist from the use of automatic machinery".

1.12. The stand taken by the employers' representatives, on the other hand, was that, "the very largeness and the complicated nature of the operations of some concerns made computerisation a necessity in the interest of efficient functioning. The problem of local redundancy created by the introduction of such automatic processes could be dealt with under the procedure evolved at the 15th Session of the Indian Labour Conference

for dealing with similar problems resulting from rationalisation. It was emphasised that automation eventually created more employment within the economy. The real question for consideration, therefore, should not be whether automation should be introduced or not but what measures could be taken to deal with the problems of labour displacement that might arise. It was not desirable that in a technological age India should stay away from the main-stream of progress and where industries had to compete in the international market introduction of automation might be almost imperative. It was the employers' view that fears of large-scale displacement of labour were unwarranted as automatic processes had been introduced only in a few establishments and the existing resources available to industry would not enable it to introduce automation on a large scale. In any case, when no retrenchment was involved and when the employers and the union at the plant level were agreed there should be no objection to the installation of computers"

1.13. The Labour Minister of Maharashtra suggested that "a tripartite sub-committee of the SLC should be constituted at the Centre for laying down policy guidelines in respect of introduction of automation. This Committee should be assisted by experts. Within the framework of the guidelines formulated at the national level the appropriate Government should consider each individual proposal for introduction of automation and decide whether it could be permitted. The Sub-Committee should also undertake periodical review of the general effects of automation and study how the policy guidelines are working in practice."

1.14. The deliberations of the Committee, however, ended inconclusively. Summing up the discussions, the Labour Minister stated that although there was no consensus, Government would keep in view the views expressed by the different parties in arriving at a decision; and that the existing procedure for screening of proposals for import of computers would continue.

1.15. The Government in the meanwhile continued to allow automation on a selective basis. In its view, a total ban on automation was not desirable as it would deprive the economy of the benefits of technological progress so necessary for rapid industrialisation and economic development.

Constitution of the Committee on Automation :

1.16. In pursuance of the suggestion made at the SLC meeting (July, 1968) for constitution of a tripartite sub-committee on automation, the Government of India, in the Ministry of Labour, Employment and Rehabilitation decided to constitute a committee with an adequate number of experts on it. The central organisations of employers and employees were requested to nominate their representatives. The Committee on Automation was set up *vide* Resolution* No. 31/7/68 LRIV, dated 19th July, 1969 of the Ministry of Labour, Employment and Rehabilitation with Shri R. Venkataraman, Member, Planning Commission, as its Chairman and the following members:

- (1) Shri G. Ramanujam
- (2) Shri Begaram Tulpule
- (3) Shri Satish Loomba
- (4) Shri B.D. Somani
- (5) Shri Babubhai M. Chinai
- (6) Shri Naval H. Tata
- (7) Prof. V.M. Dandekar
- (8) Prof. V.R. Rao
- (9) Brig. B.J. Shahaney
- (10) Dr. B.S. Garud

Shri R. Venkataraman resigned from the Chairmanship of the committee on 22nd March, 1971. In his place Prof. V.M. Dandekar, Director, Gokhale Institute of Economics & Politics, Poona, was appointed as Chairman *vide* Government Resolution** No. U. 23025/1/71-LRIV, dated 24th July, 1971. Consequent upon his appointment as General Manager of the Durgapur Steel Plant, Shri Bagaram Tulpule resigned his membership of the Committee on 4th November, 1971. His place on the Committee was taken by Shri Ram Desai.***

1.17. At the first meeting held on 17th September, 1969, the Committee, in order to facilitate its expeditious functioning, recommended to the Government that each Member of the Committee representing employers' and workers' organisations should be allowed to nominate an alternate who would attend

*Appendix-I.

**Appendix-II.

***Appendix-III

the meetings in the unavoidable absence of the principal Members. The report will, however, be signed by the principal Members only. The Government of India accordingly notified the following alternate members under Government Resolution* No. 31/18/69-LRIV, dated 9th December, 1969.

<i>Principal Member</i>	<i>Alternate</i>
(1) Shri Naval H. Tata	(1) Shri T.S. Swaminathan
(2) Shri Babubhai M. Chinai	(2) Shri P. Chentsal Rao
(3) Shri B.D. Somani	(3) Shri S.C. Aggarwal
(4) Shri Begaram Tulpule	(4) Shri Ram Desai
(5) Shri G. Ramanujam	(5) Shri Raja Kulkarni
(6) Shri Satish Loomba	(6) Shri P.P. Patil

1.18. Later, Shri N.M. Vakil, Secretary of the Employer's Federation of India was nominated as an Alternate Member in place of Shri T.S. Swaminathan who resigned for reasons of health with effect from 4th August, 1970. On Shri Tulpule's resignation in November, 1971, Shri Ram Desai was appointed as a principal Member.

Terms of Reference :

1.19. The Resolution while outlining the Government's policy in regard to automation as one of selectivity and regulation so as to make its introduction consistent with the social good of the community, emphasised the need to clearly define the criteria to determine such selectivity. The purpose of the Committee and the terms of reference as set out in the Resolution are reproduced below :

"The socio-economic effects of the introduction of automation measures in industry, commerce, administration and other related fields have recently been the subject of a good deal of debate in the country. It has been urged that automation reduces employment potential in individual industries and occupations; on the other hand it has been argued that automation is part of the modern technological progress, is indispensable for industrial and economic development and helps to create new industries and expand existing industries in a manner

which would not be possible without automation. Certain export-oriented industries have also pleaded that, without automation, they cannot compete in foreign markets with manufacturers from other countries which place no restrictions on automation. Government's policy in this regard has been that automation could be introduced but on a selective basis and that technological advance should be regulated to make it consistent with the social good of the community. The criteria which determine such selectivity need to be more clearly defined, and for this purpose, the Government have decided to set up a committee."

The following will be the terms of reference of the committee:

- "(1) To review the total effects of the operation of automation in the enterprises in the public and private sectors in which it has been already introduced.
- (2) To recommend criteria for the determination of any specific areas and fields in which introduction of automation including computers, may be permitted or restricted with due regard to :
 - (i) the need for raising efficiency and productivity in industry and trade, and in particular industries which are export-oriented ;
 - (ii) the requirements of scientific research and development;
 - (iii) the need for the timely tabulation, analysis, study, etc. of the large masses of data that arise in modern industry, trade, transport, etc.; and
 - (iv) the need for restricting the import of foreign equipment for automation and for encouraging the use of such equipment manufactured in the country.
- (3) To recommend safeguards for avoiding or minimising any harmful social effects of the introduction of automation.
- (4) To consider and make recommendations on any other related matters."

1.20. The terms of reference were discussed in the first meeting of the Committee and it was unanimously decided that it would be well within its scope to consider the admissibility of

automation in the socio-economic conditions presently prevailing in the country including the needs of a developing economy. It was also agreed that for the purpose of the Committee's work, the term 'automation' was to be understood as distinct from 'rationalisation' as agreed to at the 15th Session of the Indian Labour Conference.

Method of Inquiry :

1.21. At our first meeting, we also considered the programme and schedule of work. We found that there was not much information readily available on the various aspects of the subject. We noted that in spite of the controversy and agitation going on for some years, there was very little published material available on the subject—not even a full list of units in the country having computers, not to say of the absence of any information or study on the impact of automation/computers on the organisation, costs, efficiency and employment*.

1.22 In order to build up information on the various aspects of the subject and to elicit views on the issues before the Committee, we decided (a) to issue a questionnaire, (b) to conduct some case studies in units which have introduced automation, and (c) to record oral evidence of concerned parties.

1.23 Questionnaire : We constituted a Sub-Committee to prepare a draft questionnaire. The questionnaire** a finalised by the Committee at its second meeting held on 11th November, 1969 consisted of three parts : (i) General Questionnaire, (ii) Supplementary Questionnaire (A), and (iii) Supplementary Questionnaire (B). The General Questionnaire was intended to elicit views relating to various policy aspects such as definition and scope of automation, justification for automation in the present socio-economic context, impact of automation on labour and industry, policy alternatives, criteria for selectivity, safeguards for workers, etc. The Supplementary Questionnaire (A) was addressed to employers having direct experience of automation, and contained specific questions relating to objectives and motivation for introducing automation, procedure adopted, computer utilisation, economic and social effects,

*The Report of the Works Study Team on Automation (Office Automation) appointed by the Government of Maharashtra, which partly filled this gap as regards Maharashtra State became available only in May, 1970.

**Appendix-V.

impact on employment, etc. Supplementary Questionnaire (B) was addressed to trade unions in units which had introduced automation/computers.

1.24. The questionnaire was mailed in all to about 1,400 parties including organisations of employers and trade unions (central, regional and State level), individual trade unions, public sector undertakings, private joint stock companies with paid-up capital of Rs. 50 lakhs or more, Central Ministries, State Governments, educational and research institutions and certain eminent individuals. In all 227 parties sent replies to the questionnaire. Our respondents included major industrial organisations in public and private sectors, central organisations of workers and employers, individual trade unions, certain universities, research institutions and individuals*. All the replies received were tabulated and analysed for our use.

1.25. In addition to the questionnaire, the Committee addressed different State Labour Departments for supplying certain primary information regarding computer installations within their States. The information received from them was, however, not quite up-to-date, and it was evident that even the State Governments did not have necessary information on this subject. During the course of its working the Committee collected relevant information regarding computers installed from their suppliers viz. I.B.M. and I.C.L. The Committee received their full co-operation.

1.26. **Case Studies** : One of our main terms of reference was to review the total effects of the operations of automation in the enterprises in the public and private sectors in which it has been already introduced. In order, therefore, to study more closely certain aspects of automation such as the procedure adopted for introduction of automation and the consequential socio-economic effects on the establishment and labour, we decided to undertake certain unit level micro-studies. For this purpose, we selected some establishments including manufacturing as well as service industries both in private and public sectors, giving due representation to different regions. During these studies**, besides collecting statistical data relating to working of the computer, employment, wages, etc., qualitative information on issues relating to introduction of automation, management and trade union attitudes, etc. was also obtained through

*Appendix-VI—Category-wise list of respondents.

**Appendix-VII—List of establishments studied.

detailed interviews with top management officials including EDP managers and personnel managers, and trade union leaders.

1.27. In addition, we also made an attempt, in the case of a few units viz. L.I.C. Bombay, State Bank of India, Bombay, and Bombay Suburban Electric Supply Company to estimate specifically the loss of potential employment consequent on computerisation of work, as also the comparative cost of manual and computerised operations for the same items of work.

1.28. Oral Evidence : Another important source of information for us was the evidence given by the various parties*. We visited a few important centres in which a fair number of units having computers were located. The centres chosen for this purpose were Ahmedabad, Bombay, Calcutta, Jamshedpur, Madras, Bangalore and Delhi. All important organisations/individuals who had evinced interest in our work either by sending replies to the Committee's questionnaire or otherwise were invited to give evidence before us. During the discussions with these parties, the Committee sought certain clarification/elaboration of their views, in addition to seeking their views on certain other issues which emerged in the course of our work from time to time.

Other sources of information :

1.29. The Committee had also before it the relevant published literature on automation in other countries such as Japan, U.S.A., U.K., U.S.S.R., West Germany, Sweden, etc. As we have mentioned earlier, there was very little published material available relating to automation in India. However, at the time the Committee was studying the problem some information in the form of studies made by certain official and non-official agencies became available. Among these may be mentioned the Report of the Working Group on Computers of the Electronics Committee and the Report of the Works Study Team on Automation (Office Automation) appointed by the Government of Maharashtra. We are also happy to note that of late, the subject of computers has aroused much public interest and certain studies on the subject have been undertaken by research institutions such as Indian Institute of Management, Ahmedabad, Administrative Staff College, Hyderabad, National Productivity Council, Computer Society of India, etc. The Committee had the benefit of some of these.

*Appendix-VIII—List of parties who appeared for oral evidence.

CHAPTER-II

SCOPE AND PRESENT POSITION

I

SCOPE

Mechanisation of work is no recent development but dates back to the 'Industrial Revolution' in the eighteenth century and earlier. Until recently what machines replaced or supplemented was human physical effort. Certain recent development in technology have brought about a qualitative change in the technological progress in that they facilitated the replacement of human mental effort in production processes. Automation is the term applied to these changes.

2.1. The term automation', since it was first used in 1947, by Dell Harder of the Ford Motor Car Company, has been used to convey different meanings, covering anything from simple advances in mechanisation to advanced technology involving the use of automatic machinery and sophisticated equipment including computers. The term has been variously defined and described by different authors looking at it from their own particular angles—technical, engineering, production, organisational or social and economic.

2.2. In our own country, inspite of the controversy over the issue of automation in recent years, there seems to be no accepted definition of the term. "The term 'automation' is some times loosely used to include any form of rationalisation of work or adoption of improved methods which reduces the number of persons presently engaged in performing a specified work. According to some, automation is an attitude, a philosophy of production, rather than a technology of electronic devices ; and it is distinguished only by one feature, namely reduction in the number of persons who are to be employed in producing a certain quantity of goods and services".* Our first task,

*Automation in India. Paper presented by the Ministry of Labour & Employment at the 28th Session of Standing Labour Committee, July, 1968.

therefore, was to define the term 'automation' so as to set the limits to the scope and range of our enquiry.

2.3. In spite of the confusion in the popular mind, there was discernible in most writings on the subject, appreciation of an element peculiar to automation, as distinct from mechanisation in the normal accepted sense. Most writers and experts have treated it as connoting something more than a mere extension of mechanisation or just another normal step in the continuous technological progress ; they have generally used the term to connote something more than and different from mere changes in technology or the mere use of better machines. From the beginning, 'automation' has been used to denote not only 'automatic handling of parts between progressive production processes' but also in the sense that it represents a new way of thinking about the total process of production, in that it denotes both automatic operation and the process of making operations automatic, with a resultant emphasis on self-regulation of the entire production process.

2.4. Although automation has often been described as an advanced technology or a high level mechanisation characterised by sophisticated devices of communication and control in self-regulation without human intervention, a clear demarcation line is often not visible since there is a range of degrees of sophistication of the control devices. "Technology encompasses mechanisation, mass production and automation evolving historically in that order. Mechanisation involved the use of machines to perform work ; mass production involved a new technique for production organisation ; and automation, the third phase, is a technology based on communication and control".*

2.5. It is often claimed that while automation is not a new phenomenon, it is not also a single and easily identifiable development ; that it, in fact, symbolises the confluence of several independent streams of technical progress, which can broadly be grouped under (1) Integration (2) Feedback Control and (3) Computer Technology. *Integration* consists essentially of linking together conventionally separate manufacturing operations into lines of continuous production, through which the product moves untouched by human hands. It refers to the expansion of the scope of mechanisation by transfer devices that link machine

*Automation, Employment and Economic Stability in 'Automation and Society' edited by Howard B. Jacobson and Joseph S. Roneck, New York, Philosophica Library (1959) p. 60.

tools in automatic production lines, and by advanced techniques of handling materials and products and of assembling components. The key principle of integration—continuous automatic operation or flow production—has been a characteristic, for many years, of industries handling liquids, gases or powdered goods, such as the oil and chemical industries. The important step, however, was to apply this principle to the manufacture of the hard and heavy components and products of the engineering industries and to the manufacturing operations of other industries whose products are solid, identical units, and which had all until then used, and mostly still use, the intermittent or 'batch' process of production. *Feedback control* covers the rapid developments of techniques of automatic control over manufacturing processes and their applications to an everwidening range of industries. Automatic process control is based on instruments that measure how far the physical or chemical state of system varies from a desired value; and on the use of this information to restore the system to the desired state. The underlying principle of this form of automation is that while a mechanism is working, information is 'feedback' to it so that any divergence from the desired performance of the mechanism is automatically corrected. In fact, in the view of many authorities, it is this factor *i. e.* feedback, which really distinguishes automation from mechanisation. *Computer technology* refers to the development of machines for the rapid and automatic processing of an increasing range of technical and business information by the electronic (digital) computer, with a consequent extension of automatic control to complex manufacturing operations and commercial offices. The computer differs from the punched card equipment or manual methods, in that it can carry through a whole sequence of operations without manual intervention of any sort, and with great precision as well as at high, speed; and in that it is flexible enough to enable successive stages of its operations to be determined by the results obtained in the preceding stages. As a store house of data, the computer enables instant retrieval of information. With numerical control the operations of machine tools or machine systems are directed by numerical instructions, recorded on punched cards or tape, which control the movements of the machine through automatic equipment. Process control links these techniques in such a way as to permit automatic operation, supervision and correction of the productive process from beginning to end.

2.6. Thus 'automation' refers to a particular kind of development combining a number of well-established

engineering principles and certain recently developed theories of communication.* In contrast to most forms of technological changes which are specific to particular industries, its principle characteristic is that it represents a generalised form of thinking about technological processes, one potentially applicable to a wide range of manual and clerical operations in many industries.

2.7. Again, in defining the term 'automation' some have taken a broad view of automation in terms of production planning, while others have stressed the engineering characteristics of techniques used and have described the technical processes covered under automation. The former category of definitions help understanding the nature of automation while the latter attempt to identify automation. The two views can be taken as complementary in understanding the implications of automation in general.

2.8. According to those who view automation in terms of organisation, an outstanding feature of automation is the nationalisation of the entire production process from raw material purchase to sale of final product. It makes possible integration of purchase, production, quality control, distribution and marketing activities; and the end product can be re-designed to make optimum use of production facilities. Viewed in this manner, "it is no longer necessary to think in terms of individual machines, or even in terms of groups of machines; instead, for the first time, it is practical to look at an entire production or information handling process as an integrated system and not a series of individual steps.....Automation is more than a series of new machines and more basic than any particular hardware. It is a way of thinking as much as it is a way of doing".**

2.9 On the other hand, the definition focussing on the engineering characteristics of automated equipment lay stress

*'Cybernetics' (from the Greek work Steersman in the sense of 'to govern' 'to control') is the word used to cover the general theory of control and communication system applied both to living organisms and to mechanical systems; one of its basic elements is the concept of self-regulation, the engineering term for which is 'feed-back', or 'closed-loop circuit'.

**"Bringing Automation Up-to-date" (By John Diebold) In New Views on Automation, Papers submitted to the Sub-committee on Automation and Energy Resources, Economic Committee (Washington, Government Printing Office, 1960) pp. 83-84 and 91.

on "(a) the range of sensory capacities now mechanised ; (b) the role of instrumentation in closed-loop control systems ; and (c) the integration of information technology (viz. computers) with production technology".**

2.10. Looking at it from the point of view of its impact on socio-economic problems—Some writers have viewed automation in a sense roughly co-terminus with mechanisation, as the most recent development in a continuing technological evolution. In their view, this latest phase is unfolding at an accelerated pace, but not so rapidly as to create any fundamentally new or structural social or economic problems.

2.11. Others, however, have looked upon 'automation' as more akin to a revolution—a complete break with past trends, a 'qualitative departure from conventional technological advance, which changes the whole focus of the economy and carries with it profound implications for manpower training and allocation, wage-structure, management techniques, industrial relations, and indeed for the entire economic, political and cultural pattern of society.*

2.12. "Automation means many things to different people. In a rigorous technical sense, it should refer only to those forms of technological change or mechanisation which combine the elements of the computer, transfer devices and automatic controls. The central idea (in automation) is that mechanical or chemical processes are directed, controlled and corrected within limits automatically that is without further human intervention once the system is established".*

2.13. In a note prepared for the 173rd Session of the Governing Body of the I. L. O. the view is expressed that considering the variety of definitions and varying scope attached to the word 'automation', it may be "most properly applied a small group of sophisticated machinery (such as computers and numerically controlled machine tools). Its meaning may be reasonably

**'Automation' : Some Classification and Management Problems Paul E. Sultan and Paul Prasov/Automation : A Discussion on Research Methods, ILO Geneva, 1969, p. 14.

* "Automation : Problems and Potentials" in Automation and Technical Change—edited by John T. Dunlop (Columbia University, The American Assembly, 1962) pp.1-2.

extended, as it often is in common usage, to include other types of advanced technology. It would be an error, however to make the word synonymous with all kinds of technical change”**

2.14. Thus, although the term ‘automation’ has come to mean different things in various quarters, it should not be regarded simply as another term for technological change. Thousands of technological advances are constantly being made in industry that have nothing to do with automation. While one may describe it in terms of different technological development, it is not solely a technological phenomenon. Automation represents a number of advanced types of mechanisation which in combination, have a unique economic and social impact. What distinguishes ‘automation’ from other forms of technological developments, and mechanisation, is the fact that automation refers to certain sophisticated technologies incorporating integration, feedback control and computer technology. In the highest form of automation, these techniques are integrated into a system of process control to achieve automatic operation of complete productive process. The National Commission on Labour in India which went into the problem of automation on some length viewed automation as the continuation of the process of mechanisation of production initiated by the industrial revolution. “The term can be applied only to an industrial process which provides data from its own operation and feeds them back to its own control which fully govern the production process. It is something which replaces direct manpower for mental or manual work or for both by self-regulating machines”.*

2.15 Keeping in view the various views expressed in regard to what constitutes automation, We defined the term ‘automation’ for the purpose of the Committee’s work particularly for the study of total effects of the introduction of automation, as:—

Technical advances involving the use of automatic machinery, incorporating automatic transfer systems or integration, automatic control or feed-back and the use of computers.

**173rd Session of I.L.O. Governing Body—Item 14 on the Agenda-ILO programme on Automation.

*Report of the National Commission on Labour (Government of India) 1969—p.257.

It would not cover (i) simple automation involving introduction of automatic machines covering a single process only and (ii) introduction of more modern machines or higher degree of mechanisation.

2.16. Our definition of the term 'automation' has found acceptance and approval of the various representatives of Governments, employees and trade unions and independent experts who gave evidence before us. There was, however, a viewpoint expressed that this definition of the term is rather too restrictive and that it should include all modern developments of mechanisation and technology, particularly, introduction of automatic machines in industries, like petro-chemicals, oil refineries, electronics, instrumentation, transportation, etc. ; in this view all these developments, though not automation in the strict sense, are synonymous with, and represent a drive towards automation, a concept of automation which would help in understanding its social and economic impact.

2.17. We are, however, unable to agree with the above view. As we have explained earlier, automation is more than mere mechanisation or technological change. If the word 'automation' is to mean anything more than advanced mechanisation, it should refer to mechanisms or production processes which are to some significant extent self-regulating i.e. are able to function in a wide range of conditions without constant attention. Further, taking into account the genesis of automation controversy in India and the circumstances leading to the appointment of our Committee, we did not find it necessary to go into the entire question of mechanisation and technological progress in general. Therefore, we agreed to confine our deliberations to automation, particularly to the introduction of computers.

2.18. In relation to computers, we found that the use of Unit Record Systems and mechanical data processing machines in office has been beyond the pale of controversy about automation, even in the context of the agitation against the computers ; these URM systems have been in use in several concerns and for well over a few decades. No one has suggested to us that these should be treated as coming under the purview of automation. Obviously, these systems cannot be taken to constitute automation in the real sense. Similarly, control mechanisms used in certain process industries like chemicals, fertilizers, oil refineries etc. will come within the scope of this definition only to the extent that the control systems cover several processes and involve integration or feed-back, etc.

II

PRESENT POSITION

2.19. While technological change—the advance in knowledge relative to the industrial arts—has been no new phenomenon, the accelerated rate at which it has been growing during the last few decades has lent to it a new dimension and to its consideration, a new urgency. It is commonly agreed that it is an important factor, to perhaps the most important factor responsible for economic growth. According to a recent study, in the U. S. A. the advance of technology contributed about 40 per cent of the total increase in national income per person employed during 1929—57. In fact, a close look at the economics that have been growing at a steady rate would lend weight to this view, that technological progress and change has been largely responsible for rapid economic growth. The phenomenal growth of the Japanese economy, which has registered a growth rate of 10 per cent in real terms on an average during the period 1947—67, is an instance in point. Several other examples can be cited. With the introduction of advanced mechanisation and automation,—of new techniques and processes like transfer machines—automatic control mechanisms using the closed loop, feed-back principle and the computer since the late forties, technological change has brought in its wake serious social and economic consequences. The need has, therefore arisen to pay greater attention to public policies concerning technological change, particularly ‘automation’.

2.20. During the last two decades automation has made significant impact on science and technology which in turn have revolutionised industry and accelerated economic growth. While the labour shortage economies are attracted to make use of automated technology to make up for manpower shortage and step up their growth rate, labour surplus economic are pressed to go in for advanced technology so as to increase productivity, promote economic growth and compete in international markets.

2.21. In U. S. A. where automated technology originated in the Ford Motor Company as early as 1947, heavy investment in automation equipment started taking place in the early 1950s. The peak period for the introduction of automation in mass production came in the 1960s. In industries such as oil refining, electric power, electronics and chemicals the entire production process came to be controlled by automatic equipment. The number of computer installations increased from a handful in 1950 to 6,000 in 1960 and nearly 77,000 in 1970.

2.22. In Japan, the introduction of automation took place in the late 1950s with an increasingly felt need for raising productivity to reconstruct the war-shattered economy and accelerate economic growth. Many of the Japanese industries such as steel, power, chemicals, machines, heavy vehicles are using integrated production processes. The major steel firms are having the modern integrated steel plants, large-sized power stations have centralised control system; chemicals and fertilizer plants are usually highly automated; fabrication in the automobile industry is fully automated. Some of the railways are run by the computerised centres. In the office sector a high level of automation has been achieved and most of the large firms are using electronic data processing system. Japan had over 4,500 computers in 1969 in use in its factories and offices. An important feature of automation in Japan is that it is mostly confined to the large size units which have the advantage of large scale production and credit worthiness before the private banks.

2.23. The United Kingdom is one of the leading European countries as far as the progress of automation is concerned. Automation has led to remarkable technological advancement in manufacturing industries such as chemical, petroleum, iron and steel, motor vehicles, textiles, cement, paper printing, food and brewing. Rationalisation of paper work in offices has been achieved through computers, which numbered 5,000 in 1969.

2.24. In West Germany, use of automation which started during the late 1950s has now reached a very high level in fuel, power and process industries. The instruments manufacturing industry, electronics, iron and steel, machine tools and non-ferrous metals are leading in the field of automation. In the office sector, computerisation set in relatively late and was introduced a phase in manner. West Germany had about 6,400 computers in 1969.

2.25. In U. S. S. R., practically all branches of industrial production have made significant progress in automation. Automatic transfer machines are widely used in manufacturing process. It is estimated that by 1965, 90 per cent of the total rated capacity of all hydro-electric power stations had been automated projects were developed for a high level of automation in coal mining; 95 per cent of pig iron and steel was produced in furnaces equipped with automatic controls; a high degree of automation had been achieved in manufacturing of a large number of chemical products as also in many of consumer goods industries and

transport and communications. It is expected that complete automation will be realised on a massive scale by 1980 with an increasingly rapid transition to a complete automated workshops and factories.

2.26. In our own country, the advance, though substantial, has been less spectacular. Even today, our economy operates at various levels of technology ranging from the most primitive to the most sophisticated. Productions carried on using varying levels of technology, with (1) hand tools, (2) machine and power tools, (3) rationalised and modernised plants and even with (4) automation and electronic devices, each of them important in its own sphere.

2.27. But, under the impact of economic planning, and the increasing awareness of the need to achieve faster economic growth, industrialisation and with it technology and mechanisation, have made considerable progress in India since Independence. New industries have been set up and old industries modernised. New units have been set up with more modern machines using more up-to-date technologies.

2.28. The progress towards automation, however, has been understandably slow considering that India was a late starter in the race for industrialisation. Further, the constraints imposed by a developing economy characterised by labour surpluses and scarce capital resources have also had their inhibiting impact. In view of the preponderance of the small and medium sized, units and the emphasis laid on labour intensive techniques, coupled with scarcity of foreign exchange resources and indigenous technical know-how, adoption of highly advanced technology was considered neither desirable nor feasible except in a few instances; and the trend was for the adoption of intermediate level technology. The use of the more sophisticated or automated technology was further inhibited by factors such as, the very high cost of automated equipment, lack of qualified scientists and technicians, and to few managers who could make use of such equipment in an effective way. The resistance by workers at the unit level on grounds of its consequential restrictive effects on job placement and employment opportunities, also was a factor which slowed its growth.

2.29. As stated earlier, automation involves mechanisms or production processes which are to a significant extent self-regulating and such servo-mechanical autonomy in complex equipment is achieved usually by the coupling to the mechanism of

some form of computer—generally an analogue computer. Instances of such automation in the manufacturing industries are still very few in our country. What we have in our industries, even those which are modernised, is largely advanced mechanisation including, in some cases, the use of automatic machines, covering a single process or some times a few stages in a process. Automatic looms, continuous printing and dyeing process etc. in the textile industry, assembly line production in the automobile industry, automatic machine tools in use in the engineering industry, and the automatic process control equipment in use in the steel industry, petro-chemicals, oil refineries, power generation, etc. represent to an extent 'the drive towards automation' in Indian manufacturing industries ; however, these instances fall in a different category and do not constitute "automation" characterised by complete integration of processes through central control, usually achieved by means of a computer.

2.30. The predominant type of automation we have in India is the use of computers in offices and administration, for data processing. The instances of the use of automation mentioned by the various organisations who gave evidence—oral or written—before the Committee, all related to the use of computers only. Thus, in any practical consideration of the problems of automation, in India we have to look at it as computer used automation. *For our present purpose therefore, we confine our selves to computers and computerisation.*

COMPUTER INSTALLATIONS :

2.31. The history of computers in India is of recent origin. The computers did not make their appearance all of a sudden displacing human hands at work. Mechanisation of office work had made considerable headway with the unit record system of data processing. The first unit record machine was introduced in India in the twenties at the end of 1970, there were nearly a thousand such systems in use in various organisations in different parts of the country. A majority of commercial concerns, presently using computers, were earlier using unit record machines

2.32. As on August, 1971, there were 140 computers in use in India,* with another 75 on order, not a large number compared to the number of computers in use in some of the industrially advanced countries.** Although the first computer was installed

*Appendix-IX.

**Appendix-X.

in 1956 at the Indian Statistical Institute, Calcutta, it was only in 1961 that a computer was installed in a commercial undertaking, namely Esso Standard Eastern Inc, Bombay. During the next three years, 1962, 1963 and 1964, 14 computers were installed out of which as many as 12 were in research and development organisations. It was since 1965 that the pace of computerisation in commercial undertakings quickened, the number of computer installations during the two years 1965 and 1966 being 30. In the next three years, there was a further spurt in the installation of computers, the average being 20. Although 1970 registered a fall in the number of installations, the year 1971 showed a large increase, the highest number in any year. The following table shows the number of computers introduced year-wise and sector-wise.

TABLE I
Computers in India (August 1971)
(Year-wise and Sector-wise)

Year of Installation	Government Depart- ments	Public Sector Under- takings	Private Sector Under- takings	R & D	Total
1	2	3	4	5	6
1961	—	1	1	—	2
1962	—	1	—	1	2
1963	—	—	—	3	3
1964	1	—	—	8	9
1965	1	3	5	5	14
1966	1	6	5	4	16
1967	3	5	11	3	22
1968	—	9	8	3	20
1969	2	5	10	2	19
1970	1	5	4	—	10
1971 (partial)	1	4	11	7	23
TOTAL	10	39	55	36	140

It may be mentioned that the computers in some of the organisations, particularly those which are basically service centres, are utilized by several outside users who do not have their own computers.

2.33. The geographical distribution of computers is governed by the nature and volume of industrial and administrative activities undertaken in the centre or region. It is not surprising, therefore, that a majority of computers are found to be in use in a few major centres of industry like Bombay (35), Delhi (20), Calcutta (14), Bangalore (11), Madras (7), Hyderabad (6), Jamshedpur (5), Poona and Kanpur (4 each), and Ahmedabad (3). State-wise, the largest number of computers i. e. 39 (27.9%) is in Maharashtra followed by Delhi with 20 computers (14.3%), West Bengal with 18 computers (12.9%), and Uttar Pradesh and Mysore with 11 each (7.9%), Andhra Pradesh has 9 computers, Bihar and Tamil Nadu 7 each, while Gujarat has 6 computers. There are 3 computers each in Orissa and Kerala, 2 each in Assam and Madhya Pradesh and one each in Punjab and Rajasthan.*

2.34. Of the 140 computers already installed, 36 (25.7%) are installed in different research institutions, Institutes of Technology and universities; 10 computers are in government departments and the remaining 94 (67.1%) are operating in commercial and industrial undertakings. Out of these, 55 are in private sector undertakings and 39 in public sector undertakings, including railways.

2.35. Industry-wise**, the largest number of computers i. e. 24 is found to be operating in the engineering industry. Textiles and chemicals and chemical products along with petroleum account for 13 each, railways (excluding the three production units) for 11, automobile and banking and insurance for 4 computers each.

2.36. The ninety-four computers in use in commercial and industrial undertakings are installed in 65 establishments. Out

*Appendix-XI

**Appendix-XII.

of these, 51 establishments*, accounting for 61 computers, are registered under the Companies Act. The distribution of these 51 companies according to their paid-up capital, is given below:

TABLE II
*Distribution of Companies According to
Paid-up Capital*

Paid-up Capital (Rs.)	Total No. of companies registered under the Companies Act**	No. of companies having computers	Percentage of Col. 3 to Col. 2
1	2	3	4
0—50 lakhs	26,498	3	—
50 lakhs to less than 1 crore	392	6	1.53
1 crore to less than 5 crores	383	25	6.53
5 crores to less than 10 crores	30	8	26.67
10 crores to less than 20 crores	15	4	26.67
20 crores and above	17	5	29.41

It is seen that 17 of the top 62 companies, having paid-up capital of Rs. 5 crores or more, had, gone in for computers. Of the 383 companies with a paid-up capital of 1 crore to less than 5 crores, 25 companies (6.5%) had computers. Of the 26,890 companies with a paid-up capital of less than 1 crore, only nine had computers.

*Of the remaining 14 commercial/industrial establishments (having 33 computers), information is available in respect of 9 only; of these 8 had a paid-up capital/equity capital of more than 5 crores, and one had a capital of less than Rs. 5 crores. Information in respect of five viz. I.B.M., Joint Plant Committee, Kuljian Corporation, Maharashtra State Road Transport Corporation and Tata Computer Centre Consultancy Services is not available. These five establishments together account for 10 computer installations.

**Source :
“Information Broad Sheet” (giving the list of companies with paid-up capital of Rs. 50 lakhs and more as on 31-3-1968) compiled by the Department of Company Affairs.

2.37. Looking at the computer models in use in our country, (Table below), it is seen that the I. B. M. has been the largest supplier, accounting for 108 (77.1%) of the total. The other makes of computers currently in use in India are : I. C. L. (18), Honeywell (10), Minsk (2), and C. D. C. and I. S. I. J. U. (1 each).

TABLE III

Computer Models in use

Make	Model and Number	Total
1	2	3
I.B.M.	1130	6 }
	1400 series	82 }
	1620	16 }
	7044	1 }
	360/30	3 }
I.C.L.	1300	4 }
	1900 series	10 }
	Ferranti Sinus	1 }
	Elliot 803	2 }
	Elliot 920-B	1 }
Honeywell	400	10
Minsk	Minsk II	2
C.D.C.	3600-160A	1
I.S.I.J.U.		1
TOTAL		140

2.38. A feature of the computer systems in use is that with a few exceptions such as S/360/44 (Indian Institute of Science Bangalore ; Delhi University ; and Military Intelligence, New, Delhi), the CDC 3600 system (T I F R , Bombay) and the IBM 7044 system (I. I. T. Kanpur) most of the systems belong to the small to medium category.

2.39. Further, except for a few computers (such as IBM 1130 & 360 series) which belong to the third generation, all the rest

belong to earlier generations of computer. The large majority belong to the second generation computers. These are obsolete systems in the sense that either they belong to a distinctly earlier technology in terms of hardware and systems design or they are no longer in production.

2.40. A majority of computers in use in the country are acquired or purchased by the users, while others are taken on hire. The cost of a medium size Electronic Data Processing equipment with its peripherals, ranges from Rs. 25 lakhs to Rs. 30 lakhs. Its maintenance charges are Rs. 1 lakh per annum on an average. The same if hired would cost about Rs. 6—9 lakhs per year. The one-time charges to be paid in such cases amount to Rs. 1.15 lakhs to Rs. 2 lakhs. Besides, the auxiliary U. R. machines cost another Rs. 1 lakh to Rs. 1.5 lakhs per year. A small size computer would generally cost Rs. 10 lakhs to Rs. 15 lakhs and would require a monthly maintenance of Rs. 4,000 to Rs. 6,000. This can be hired on a rent of Rs. 20,000 to Rs. 30,000 per month.

COMPUTER APPLICATIONS :

2.41. The 140 computers presently working in India in different organisations are being put to different uses by individual organisations depending on their particular requirements, the objectives of the introduction of computer, the method and manner of their introduction and the degree of imaginative sophistication of their managements.

2.42. The computers in the Scientific Research and Educational Institutions are primarily used for complex mathematical engineering and statistical computations. Most of these installations are run as an 'open shop' with direct access to students and research workers.

2.43. In the realm of business applications, most of the industrial and commercial concerns, both in the private and public sector, which have gone in for computers have computerised one or more of the following applications :

- (a) Payroll accounting
- (b) Financial accounting
- (c) Sales statistics
- (d) Billing/invoicing

- (e) Inventory control/stores accounting
- (f) Productions scheduling and control
- (g) Statistics required, for management information.

All phases of these applications have not so far been computerised in many units and the programmes are in different stages of completion.

2.44. Of the computer installations in 40 business undertakings for which detailed information on their applications is available, 34 units (16 in the public sector and 18 in the private sector) have computerised inventory control/stores accounting.* The second most frequent application (in 31 units) is pay-roll accounting. Production control and planning is another commonly computerised activity, 16 units (6 in the public sector and 10 in the private sector) reporting this application.

2.45. The Indian Railways are among the largest single-computer users in our country having 14 computers working at different centres. The computer installed at the Railway Board office processes wagon movement through broad gauge, interchange points and makes reports for answering customers' enquiries. It also processes movement particulars of special type of wagons which are in short supply. The computer at Mughalsarai Marshalling Yard processes data of wagon arrival and despatches. Applications put on the computer by zonal railways include accounting of traffic revenues, fuel accounting, commercial accounting, inventory control (only certain phases) workshop incentive bonus and pay roll accounting in different phases. Computers installed by the Life Insurance Corporation of India are being used for maintaining up-to-date information with the objective of providing better customer service to policy holders. One of the important applications of the computer installed by the State Bank of India is reconciliation of inter-branch transactions numbering about 70,000 per day. In the cotton textile industry computers installed in certain units (such as Delhi Cloth Mills, Calico Mills) are being used for Linear Programming application to choose the proper blend of cotton so as to minimise the cost of cotton input. In Tata Engineering & Locomotive Co. computer is used for production control and scheduling, inventory control, etc. The Associated Cement

*Appendix-XIII.

Company has used the computer in the area of Project Evaluation and Review Techniques (PERT).

2.46. In the absence of large sized computers, sophisticated applications in the areas of decision making, Operations Research Techniques applied to planning problems, computer simulation of socio-economic systems, and a wide variety of other complex physical and behavioural systems have not yet been attempted in any significant way. The integrated management information system has so far not been built up in many of industrial/commercial establishments. Some initial efforts are reported to be under way in the use of computers in decision making. Some agencies have been using the Linear Programming (LP) and Project Evaluation and Review Techniques (PERT) packages developed at the TIFR's 3600 system and the 7044 system at Kanpur. For the management decision-oriented applications the preparatory period has to be longer since an adequate data base has to be built-up. Most of the undertakings in India have not yet reached this phase of computerisation.

2.47. So far, the conventional application areas like pay roll, billing, invoices, financial statistics, etc., have been predominant in the computer usage. A major factor which seemed to have impelled managements to computerise conventional applications was perhaps that work relating to those jobs was already, atleast partially, mechanised with the aid of Unit Record Machines. Apart from ensuring continuity with the older system, other considerations which appear to have weighed with managements in selecting the conventional areas of computer applications are that these were easy to operate and enabled them to gain the necessary experience and expertise before they went on to more complex application areas; it was also stated that any organisation planning to use the computer for building up its management information system has to build up its data base by computerising the so called conventional areas. However, so far, problem solving applications and management decision-oriented applications are still not taken up at many computers. Some of these applications require systems larger than what the organisations generally have at present.

Computer Utilisation

2.48. According to the information received in respect of 70 computer installations, 19% were working one shift, 44% two shifts and 37% three shifts. The utilisation was somewhat

better in the commercial organisations, as compared to R & D organisations—those working for one shift accounted for 7% of the total while in the R & D organisations this accounted for 29%. In respect of 49 computers (belonging to 46 commercial organisations), it is found that as in July, 1970 there were as many as 86% of computer installations working for two shifts or more while in R & D their percentage was about 70.

TABLE IV

Computer utilisation

Clock Hours used	No. of shifts* (approximately)	No. of computers	
		Commercial	R & D
1	2	3	4
Upto 200	1	7 (14.3%)	6 (28.6%)
200—300	2 shifts	4 (8.2%)	4 (19.0%)
300—400	3 shifts	19 (38.8%)	4 (19.0%)
400—600		14 (28.6%)	1 (4.8%)
Over 600		5 (10.2%)	6 (28.6%)
TOTAL		49	21

Figures in brackets indicate percentages.

*On the basis of 8 hours per day and 25 working days per month.

It may be mentioned that of the 7 commercial computers which were working for one shift or less, 5 were installed only in 1969 which perhaps explains their relatively low utilisation. Of the 49 computers, 11 were also doing outside work, although except in one or two cases, the extent of outside work was very small.

2.49. Several of the university, R & D computer centres have experienced difficulties in the satisfactory utilisation of their systems for reasons such as inadequate budgetary provision for supporting staff, stationery, etc. and inadequacies of the system, as regards hardware, ancillary equipment and software support.

2.50. The Works Study Team on Automation in Maharashtra State which went into this question of utilisation of computer, came to somewhat similar conclusions. They found on the basis of a study of 17 computers in Maharashtra State in January, 1969, that 4 of them were working one shift or less, while 76% were working for two shifts or more and 10 computers for one to two shifts and only 3 computers for three shifts. They observed: "the current utilisation of computer time varies from organisation to organisation and from one category to another. In relation to established organisations over two-thirds of EDP installations have achieved full or fairly satisfactory level (75 to 85%) of computer utilisation. 48% of the total EDP installations in the State work for 13 to 16 hours (more than 1½ shifts to 2 shifts) a day while another 3 installations work round the clock. The educational and research institutions, however, do not use the computer facility very adequately".*

2.51. According to a recent study of computer utilisation made by the IBM "computer utilisation in India has been extremely high; amongst the highest in the world. . . . The All India average of computer usage for computers of this series installed for one year or more (based on the latest available figures for three months in the middle of 1970) is 237.6 meter hours per month. If we take six full working days a week, eight hours a shift a day, 15 holidays and no time for servicing or maintenance, we have 199 clock hours available for one shift in a month. Since the meter time is approximately 60 per cent of clock time, the maximum number of meter hours available per month, based on the above assumption, is 119.4 hours. When we consider we have not included any time for servicing and maintenance, we see that the average computer usage for all IBM 1400 series computers installed in India for a year or more is over 2 shifts a day. Some computers are used three shifts a day, seven days a week. All in all, this amounts to a very high degree of usage."

Production of computer systems in India :

2.52. In India the first attempt to develop a computer was started by the Tata Institute of Fundamental Research in 1954 and a pilot general purpose computer was completed in 1956. This resulted in the birth of a computer which was named T.I.F.R.A.C. and this was in operation till 1964. An attempt to develop a general purpose second generation computer was

*Report of the Works Study Team on Automation (Office Automation) in Maharashtra State; 1970, p. 179.

undertaken by the Indian Statistical Institute in collaboration with Jadavpur University in Calcutta in 1963. This computer I.S.I.U. is at present in operation in Jadavpur.

2.53. The current manufacturing programmes of computer systems and ancillary equipment in the country are discussed in the following paragraphs.

2.54. The International Business Machine World Trade Corporation (IBM) had a commercial outlet in India since 1950, and started their manufacturing activities in 1963. They have a factory in Bangalore manufacturing punch cards. In their factory in Kurla, Bombay they make .029 key punches, unit record equipment, and recondition and assemble 1401 central processors. The .029 key punches are being exported to all the IBM branches and subsidiaries in S.E. Asia, from India. The foreign exchange earnings from these exports are utilised by IBM to import disassembled 1401's for reconditioning and resale within India, as well as other peripherals needed for local 1401 installations. IBM have been granted industrial licences :

- (1) To recondition 68 computers of the 1401 series over a 3-year period, 22 each in 1968 and 1969 and 24 in 1970
- and (2) to manufacture .029 key punches upto a maximum of 4,000 units.

They have also applied for a licence to recondition 360 series computers instead of 1401 series computers for sale on rupee payment within the country.

2.55. The International Computers Indian Manufacturing Co. Ltd. (ICL) was formed in 1963 and has been engaged in manufacturing ICL (Originally ICT) off-line card preparation equipment in its plant in Poona. Non-printing key punches, verifiers, duplicators, interpreters, etc., are being locally made and exported for ICL usage elsewhere. With the foreign exchange earned thus, ICL have been selling (and maintaining) in India their systems like 1004, 1902, 1903, etc. ICL have been awarded an industrial licence to manufacture 48 systems of the 1901-A series in collaboration with Bharat Electronics Ltd., of Bangalore. In this joint venture, the role of BEL is purely that of a subcontractor and they do not have any responsibility for marketing the systems.

2.56. The Computer Group of the Electronics Division of Bhabha Atomic Research Commission has developed a real-time computer named TDC-12; the Electronics Corporation of India Ltd., Hyderabad, has taken up the regular production of these computers. It is scheduled to produce in the 4th plan period 23—35 systems and to achieve thereafter a production capacity of 10 per year. In keeping with the policy of encouraging indigenous design and production in the field of computers with a view to achieving self-reliance, a 'proposal from ECIL for the manufacture of small to medium sized computers—TDC 18 and TDC 32 machines—has been approved by the Electronics Commission.

2.57. Government's policy in regard to manufacture of computers has been spelt out in the latest annual report of the Department of Electronics. According to this, "no further manufacturing programmes based on the renovation of 'As is' machines will be accepted in future as a matter of national policy. The current programmes based on 'As is' machines are being 'phased out. The Department is now engaged in the task of evolving a policy towards self-reliance in the computer field... Whilst the policy is under formulation, the following guide lines will be adopted for dealing with immediate problems:—

- (a) All manufacturing programmes for computer systems in the future will be based on terms and conditions as generally applicable to all other manufacturing programmes in the country.
- (b) Manufacturing programmes with majority foreign collaboration will be generally accepted only on a 100% export basis.
- (c) All users should first attempt to meet their in-house requirements through computers available in the Indian market and additionally draw on the facilities offered by Regional Computer Centre.
- (d) Computers, other than those available in the Indian market through Indian manufacturing programmes, will be regarded as expensive items of import. Accordingly, requirements for in-house computer facilities, involving import of such systems, will have to be considered on the merits of the case as seen in terms of the relevance of such applications to national development programme and related priorities.

CHAPTER III

I

IMPACT OF COMPUTERS

One of our terms of reference requires us 'to review the total effects of the operation of automation in the enterprises in the public and private sectors in which it has been already introduced.

3.1. In assessing the total effects of the operation of automation in India, we were greatly handicapped because of the inadequacy of available data; and by the absence of any comprehensive empirical study which could reflect satisfactorily the magnitude of the problems involved and the ramifications of the impact of automation in its various aspects. This is perhaps only to be expected considering that automation has been a very recent phenomenon in our country and it is only now that attention is being focussed thereon. But, even on the much wider and basic subject of technological change in general and its socio-economic consequences in a developing economy like ours, no study at the national level appears to have yet been attempted; though there have been some attempts to study some of the technical and economic factors involved in the choice of appropriate technologies for Indian industries. Among the recent studies on the impact of automation may be mentioned the report of the Gokhale Commission on job security in oil companies and the report of the Works Study Team on Automation (Office Automation) in Maharashtra. In reviewing the total effects of automation we have primarily relied on documentary and oral evidence placed before us, and on case studies undertaken by our Secretariat. We are, however, aware that all this material is not free from some limitations.

3.2. We have discussed in an earlier Chapter the present status of automated technology in our country. We found that in the production processes, full automation hardly exists in any Indian industry. Automation in manufacturing processes to some extent is being introduced in certain industries like fertilizers, petro-chemicals, oil refineries, steel plants, etc. Even in the enterprises in these industries, automated technology was intro-

duced as a part of the initial set-up and not as a replacement of an existing process or technology. In view of this, as also because of the special circumstances connected with the establishment of most such units automation in these industries has not given rise either to any controversy about its desirability or to any serious misgivings about its impact on employment, etc., for the simple reason that no existing employees or processes were affected. On the other hand, its necessity has been recognised on the basis of technical and other factors and because of the imperatives of building up immediate production capacities in some of these basic priority industries. However, in the case of computerisation, the position was different. Computer-automation is mostly prevalent in the form of electronic data processing in offices rather than in the form of process control. Further, in most cases, computers were introduced to do the work currently performed by other methods. Therefore, in evaluating the total effects of automation, we have given particular emphasis, in the following paragraphs, to the study of the impact of computer/office automation.

3.3. Before we go on to a detailed analysis of the effects of computerisation—direct and indirect, immediate and long-term—we would like to emphasise that the experience of automation in our country is yet too short to enable us to make any firm assessment of the long term impact of computerisation.

3.4. The time-span from the commencement of planning until the time the computer is installed is fairly long, being about two years on the average. Most of the organisations claim that this is the minimum time required to carry out feasibility studies and to train the necessary staff, etc. Full induction of the computer into the organisational structure of the undertaking takes much longer—anywhere upto another two to three years. According to the replies received to the Committee's questionnaire the time taken for the planning and installation of the computer was as follows :

TABLE V
Time taken for planning and installation of computers

		Less than one year	1—2 years	2—3 years	Total
	1	2	3	4	5
Public Sector	.	3	19	1	23
Private Sector	.	4	11	1	16
	TOTAL	7	30	2	39

3.5. This long time-span is attributed to the time needed for planning, reorganisation, systems analysis and programming. To the extent that the time given to these planning stages is cut short, the process of integrating the computer into the office organisation becomes correspondingly longer. The real impact of the computer on employment and other aspects of the organisations will be felt as more and more items of work are computerised, and the information needs and the organisational pattern of the establishment are modified to suit the new E.D.P. systems. Thus, it is perhaps reasonable to assume that it may be at least five years before the effects of the introduction of computer become manifest.

3.6. The task of reviewing the total effects of automation becomes further complicated as the problems posed by automation and the advantages claimed by its introduction are often the result of the inter-action of a number of factors and forces operating simultaneously in the economy and it is extremely difficult to unravel those and isolate the effects by specific causes. Considering the time required for pre-installation planning and for making it fully operational we found that most of the computer installations in India are still in their early phases. As many as 124 of the 140 computers in India have been installed only since 1965. Of the 94 computers in use in commercial undertakings, all but 3 were installed after 1965; and as many as 47 of these are less than three years old. In fact, in most of these organisations the process of computerising their work and applications is still not complete. At this stage even the short-term effects of computerisation are yet not clearly felt; its long-term effects are yet to become manifest, and naturally a fuller enquiry into the subject has to await sometime. However, we have tried to study in as much detail as possible, its direct and immediate impact at the unit level.

Reasons for computerisation

3.7. Generally speaking, the management in arriving at the decision is influenced by several factors, mainly economic, technical and institutional; social, political and psychological factors also influence them, though less directly. It has sometimes been stated that computers were introduced in many cases as mere status symbols and to keep up with the 'Joneses' and not with any clear-cut and calculated assessment of its benefits as an effective management tool. Various studies into this aspect

of why managements have gone in for computers seem to suggest that the criticism is not altogether unfounded; and that even where the computer was introduced in order to obtain certain specific advantages, in most cases it was still not being efficiently used as an adjunct to a well-designed management information system. Accordingly to a study, "in most companies computers have been acquired as a result of pressure from within due to increase in volume of work and not out of managements' foresight and anxiety to benefit from a new management opportunity". *According to another, "...While taking certain jobs to the computer, cost considerations received considerably low priority as compared to management's desire to introduce modern management control system"***

3.8. Our own enquiries into this aspect of the problem have revealed some interesting facts. While there have been instances, though not many, in which the computer was introduced without a clear understanding of its utility and potentialities, it would appear that in many cases it was the growing volume of their operations and the development of professional management conscious of the need for adopting modern management tools and techniques that impelled them to go in for computers. In many undertakings, the managements felt that the traditional methods were inadequate or unsuited to their expanding operations. In some, computers were considered indispensable for developing certain new or better quality products, design, project planning, etc.

3.9. It is only reasonable to expect that there would be several reasons for an organisation resorting to office automation, although, one or two of these may relatively be the most important. And the importance of particular factors is also likely to differ between units, depending on their own individual circumstances. A recent study† of the factors responsible for the introduction of office automation in some advanced countries of the West, lists these factors in order of their relative importance. Among the positive factors listed are:

- (1) Possibility of satisfying new demands/and more long standing demands as a result of (a) general economic

*Computers & Corporate Policy—The Indian Institute of Management, Ahmedabad, p. 18-19.

** Report of the Works Study Team on Automation (Office Automation) in Maharashtra State (1970), p. 37.

†Office Automation in Social Perspective by H.A. Rhee (1968); Basil Blackwell & Mott Ltd., Oxford.

expansion and (b) office expansion and growing volume of business transactions;

- (2) Availability of equipment to accomplish tasks previously impossible and to simplify procedures;
- (3) Possibility of (a) reducing large volume of data to manageable volume of usable information; (b) converting data into information *speedily*; more timely reports; (c) converting data into information with greater accuracy and reliability;
- (4) Prestige. Image of the organisation;
- (5) Tax advantages of employing the system;
- (6) Knowledge of successful applications elsewhere.

Among the negative factors listed are:

- (1) Inability of the office to cope with volume of work in certain departments. Delays;
- (2) (a) Equipment worn out and due for replacement,
(b) Invidious growth of paper work; inadequacy of procedures;
- (3) Increasing difficulties of staff due to:
 - (a) Steep rise in labour costs,
 - (b) Hard to obtain skilled office staff,
 - (c) High labour turn-over,
 - (d) Space for additional staff in city offices scarce and expensive;
- (4) Fear of lowered prestige with customers;
- (5) No good reason at all (band wagon effect).

3.10. Several of these factors mentioned are applicable in the case of organisations which introduced computers in India also. But, as should be expected, the order of importance has varied. The factors commonly mentioned as reasons for introduction of computers in India are:

- (1) Inadequacy of the unit record system to cope with increased volume of data;

- (2) Improvement in quality of the products;
- (3) Better service to the consumers;
- (4) Reduction in cost of production and consequent improvement in competitive position;
- (5) Greater speed and reduction in time lag in processing of information;
- (6) Greater accuracy in compilation and analysis of data; and
- (7) Efficient management information system.

3.11. The organisations which have replied to the Committee's questionnaire have mentioned several of these factors, many of them giving more than one of these, as motivation for their going in for office automation. An industry-wise analysis of this information is given in Appendix-XIV. A summary statement is given below. In interpreting the data in the statement it should be kept in view that the several considerations enumerated as motivation are not mutually exclusive; in fact they are in many cases complementary.

TABLE VI
Motivation for Computerisation

Motivation for installing Computer	No. of organisations		Total
	Public Sector	Private Sector	
1	2	3	4
1. Improvement of quality of products/ service	20	16	36
2. Reduction of time-lag in tabulation and analysis of data	19	18	37
3. Facilitate management decision making	19	17	36
4. Increase in output	15	14	29
5. Scientific Research and development	—	12	12
6. Reduction of labour cost	2	3	5

Total No. of respondents : 40.

According to the Works Study Team on Automation (Office Automation) in Maharashtra State "The use of computers in commercial applications stems from three major objectives, firstly, the volume of data is too large for manual processing; secondly, to reduce time-lag in receipt and processing data; and thirdly, to introduce modern management control system".*

3.12. As regards the achievement of these objects, most of those who have gone in for computers have stated before us that their objects have been amply justified, and that the benefits derived from the use of the computer have far outweighed the cost involved; that the improvements have been both direct and indirect, tangible and intangible, mostly in the form of improved general efficiency, better management control resulting from the availability of quicker and more accurate information on the various phases of critical operations, but also in the form of improvement in quality of the product, economies by way of reduction of waste and optimum utilisation of resources like inventories, etc., and better and more efficient service/product to the consumer. It has been stated that it would not have been possible to carry on certain operations such as inter-branch reconciliation work, control of movement of wagons, production scheduling, etc., efficiently beyond a stage. To give a few significant examples :

- (i) greater accuracy in the output of data has been claimed;
- (ii) reduction of time-lag in preparation of the final data for better management control and early realisation of dues and better distribution of the products are some of the benefits claimed by several organisations dealing with large numbers of bills/customers/clients;
- (iii) large economy in maintenance of inventories, through reduction in the stocks held and the period for which stocks are held, are stated to have been achieved by many large enterprises; computerisation of inventory work has resulted in the optimisation of the level of stocks; the periodic returns that are now available indicating the position of each item enable the management to plan and procure new stock requirements months ahead; with better control of inventories, huge sums

*Op. cit. p. 177.

hitherto locked up in holding unnecessary stocks are released and are made available for more productive uses;

- (iv) more efficient production and optimum utilisation of machinery and equipment has been achieved by the use of computer for production scheduling and production control;
- (v) improvement in quality of the product through the use of the computer for cotton blending in the cotton textile manufacture has been claimed by some.

3.13. On the other hand, the employees' representatives in their replies and evidence, while conceding the technical capability and efficiency of the computer for data processing, have stated that there is not much to show the realisation of management's claims regarding cost reduction, better control, etc. They emphasised that whatever increases in profits, etc. were gained through computerisation have not been shared with the employees or with the community by way of lower prices. In their view, even the claims made on behalf of the computer for greater accuracy are suspect; in support, we were told of instances where the computer gave out wrong information.



II

IMPACT ON EMPLOYMENT

3.14. One aspect of computers that has attracted the most attention and has aroused widespread anxiety has been its possible repercussions on employment. Anxiety about loss of employment and therefore about status, apprehensions about change of roles and enforced dislocation of people have loomed large in discussions about office automation in every country where computers were introduced. While the actual experience of computers and office automation has admittedly been less drastic and serious than was earlier apprehended, it has not been conclusive enough to allay the apprehensions either, particularly in countries with labour surpluses and high unemployment rates.

3.15. There is no denying the fact that there is wide-spread anxiety about the use of computers leading to reduction in the number of jobs and causing or aggravating unemployment. Historically, this anxiety is perhaps explained by reference to certain factors. Firstly, the early publicity of the prodigious possibilities of computers and their labour saving propensities could not but arouse fears among the employees and unions about their adverse impact on employment. The descriptions of the early computers used in laboratories dramatised the speed with which complex computations could be performed; forecasts and projections about the future development of computers emphasised its wide-spread use and the effects that it might have on employment. Secondly, the speed with which computer technology developed, within a short span of a few years, did nothing to alleviate such fears. Apart from the character of the changes taking place, it was their tempo which caused much anxiety; the pace of these changes was considered too fast for the human institutions to absorb. Thirdly, the fact that the most rapid introduction of computers took place in the U.S.A. and at a time when general unemployment rates were higher than in other economically advanced countries, could only add to this anxiety. The employment controversy has generally tended to range around the question of the immediate and localised employment effects of computers; and the less direct repercussions, outside the establishment and in the long run, have taken a rather secondary place, as they seem less easy to identify.

3.16. The introduction of automation in offices may have direct and indirect effects on employment. Directly, the work remaining the same, the number of persons employed may go down, or the same volume of work can now be done by less staff; or a greater volume of work can now be done by the same staff; or a greater volume of work can be done by less staff. That is to say, computerisation is likely to lead to either a drop in the number of jobs or to a loss of potential employment. At the same time, apart from rendering some jobs surplus, the introduction of computers would also create some new jobs at the enterprise level. The number of new jobs created due to office automation would be generally less than the number of jobs displaced. It is, therefore, said that the net effect is an adverse impact on employment. Apart from this direct impact on employment in the organisation itself, a technical innovation of this kind is likely to have more far-reaching consequences, for employment elsewhere in the economy, and for people employed in diverse occupations. Whether or not the result would be more or

less employment, would depend on a variety of other factors, some of them unrelated to the technical change itself. It is suggested that if the changes in working techniques used to produce goods or provide services are accompanied by changes in wants, *i.e.* greater and often new economic 'demands', the result may be a change in occupational composition of the working population. This in turn would tend to increase labour productivity *i.e.* improve the rate of human effort needed to produce a given quantity of product or service, leading to an increase in the volume of production. The increase in production *i.e.* the possibility of satisfying more human wants may have indirect wider repercussions beyond the immediate product or service concerned by stimulating increased gainful employment in other sectors and ultimately also within the sector where the change was first introduced. The assessment of these indirect effects and establishing a casual relationship is always difficult particularly so in the case of office automation. There is no satisfactory way of isolating the effects of E.D.P. from other social, economic, psychological, organisational and employment factors.

3.17. The experience of foreign countries seems to offer no clear picture in regard to the effects of computers on employment. To the extent that the various published studies, dealing with the short-term and direct employment effects of computers tend to ignore, for obvious reasons, the indirect and long-term effects on employment, they are of limited validity only. More over, the fact that the introduction of office automation itself may be the effect, rather than the cause, of changes in the employment position, is also not reflected in these studies. Subject to these limitations, however, these studies do offer useful data indicating the broad experience in different situations. Studies of the immediate and direct effects of computers on office employment in developed countries seem to indicate that although the computer has a great labour saving potentiality for office work, by and large, it has resulted in little serious large scale unemployment of office employees, so far. The I.L.O. conducted a study in 1965-66* based on published surveys and studies on automation in various countries and came to the conclusion that "the introduction of automated equipment has not produced

a substantial decline in employment of non-manual workers.** Although it has reduced the demand for clerical labour to some extent, this has usually been off-set by increased demand arising from expansion of the undertakings concerned, or by unsatisfied demand for labour in other undertakings. As a result, the staff that has been displaced by automation have usually been absorbed fairly readily, often within the same undertaking. This picture was borne out by the unions and employers who supplied information....". A comprehensive survey to assess the impact of office automation on clerical employment made by the U.K. Ministry of labour (1965) estimated that on an average, the installation of a computer led to a reduction of 14.5 percent of the jobs existing in the data processing sections of the office before equipment was installed and that an additional 12.5 percent would have been created to cope up with increasing work had the computer not been installed. The number of jobs taken over by the computers, thus, amounted to 27 percent against which had to be set 4.5 percent new jobs created to operate the new equipment. That is, there was a net reduction of 22.5 percent in the number of job opportunities in the data processing sections of the offices surveyed. During the period of the survey the average undertaking installing computers experienced an increase of 8 percent in the number of office jobs, but the number of jobs would have risen by approximately 13 percent had the computer not been installed. This difference in the rate of growth in office jobs in these undertakings represents about 0.75 per cent of the office workers in U.K., and working from these estimates the report forecasts that the introduction of computers in the years 1964—70 is likely to effect a reduction of not more than 20 per cent in the demand for office workers.† The surveys undertaken by the Bureau of Labour Statistics, U.S.A., show a more or less similar trend. Hearings conducted by the U.S. Sub-Committee on Census & Government Statistics of the House of Representatives Committee on Post Office and Civil Service in 1959 and 1960 to determine the extent and implications of office automation for federal clerical workers, pointed

**"Non-manual workers" has been taken to include the following groups listed in the I.L.O. International Standard Classification of Occupations : (1) Professional, technical and related workers; (2) Administrative and Managerial Workers; (3) Clerical and related workers and (4) Sales Workers.

†I.L.O., Labour & Automation, Bulletin No. 5; "Automation & Non-Manual Workers", 1967; p. 44.

out that office automation led to perceptible decline in employment. The experience in Australia of office automation has been slightly different. A survey carried out in 1962 and 1963 covering 71 undertakings using 119 computers (out of a total of 153 known to be in operation on 30th June, 1963), estimated that 1,211 new posts were created as direct result of the installation of the equipment and 561 employees were made redundant. Detailed case studies in West Germany indicate considerable labour saving by the use of computers. This was, however, a welcome development in view of the general labour shortage in the economy. As regards the probable future impact of office automation, so far as the loss of future job opportunities is concerned, there are few studies. One such study estimates : "in regard to the displacement potential of office automation, it is a conservative estimate that for every five office jobs eliminated, one is created."*

3.18. In assessing the experience of these countries, however, one has to keep in mind that most of these countries are labour-shortage economies with an abundance of capital resources and advanced technology and with developed industrial basis. Naturally, the effects of automation in such expanding economies, with full or near-full employment will be radically different from that on a developing economy with large unemployed manpower resources.

3.19. Since the impact of computers on employment has been the focal point of the automation problem in our situation, we tried to collect information which would help to measure the extent of the impact, both immediate and potential. In order to study the actual experience in regard to employment effects of computers, we made an attempt to collect information from all undertakings which have installed computers. Data were called for on the number of employees prior to and after the introduction of the computer separately for (1) the departments/sections whose work was computerised and (2) the E.D.P. departments. The information received is summarised in the following table :

*Automation in the Office—by Ida R. Hoos—p. 45.

TABLE VII

Employment changes due to computerisation in India

(Position as on 1-7-1970)

		Number of Employees									
		Before Automation			After Automation			Net Change			
Undertaking	1	Affected department- ments (exclud- ing URM)		URM	Total	Affected department- ments (exclud- ing (EDP)	EDP	Total	Affected department- ments (Col. 5-2)	EDP/ URM (Col. 6-3)	Total (Col. 7-4)
		2	3	4	5	6	7	8	9	10	
1.		21	—	21	19	35	54	-2	+35	+33	
2.		2,008	86	2,094	2,004	128	2,132	-4	+42	+38	
3.		1,065	30	1,095	1,133	107	1,240	+68	+77	+145	
4.		265	39	304	199	47	246	-66	+8	-58	
5.		86	15	101	86	72	158	Nil	+57	+57	
6.		215	50	265	138	28	166	-77	-22	-99	
7.		269	44	313	309	65	374	+40	+21	+61	
8.		256	—	256	194	42	236	-62	+42	-20	

TABLE VII—Contd.

1	2	3	4	5	6	7	8	9	10
9.	257	24	281	189	32	221	-68	+8	-60
10.	412	30	442	506	60	566	+94	+30	+124
11.	26	13	39	24	12	36	-2	-1	-3
12.	285	18	303	306	40	346	+21	+22	+43
13.	267	19	286	258	32	290	-9	+13	+4
14.	41	9	50	45	10	55	+4	+1	+5
15.	56	—	56	28	16	44	-28	+16	-12
16.	20	—	20	20	22	42	Nil	+22	+22
17.	43	17	60	45	19	64	+2	+2	+4
18.	32	23	55	32	29	61	Nil	+6	+6
19.	1,011	37	1,048	1,106	54	1,160	+95	+17	+112
20.	119	31	150	101	50	151	-18	+19	+1
21.	952	176	1,128	1,025	336	1,361	+73	+160	+233
22.	331	49	380	221	151	372	-110	+102	-8
*23.	4,526	583	5,109	3,910	912	4,822	-616	+329	-287
24.	158	—	158	140	30	170	-18	+30	+12
TOTAL	12,721	1,293	14,014	12,038	2,329	14,367	-683	+1,036	+353

*This undertaking accounts for 14 separate units.

3.20. The table seeks to evaluate the net displacement of employees in the departments affected by computerisation. In interpreting the table, one has to be cautious because in some cases the increase/decrease in employment in the departments affected may be the result of a number of other factors operating simultaneously and such increases/decreases cannot be attributed entirely to computerisation.

3.21. The table indicates that the computerisation of work has generally led to a decrease in employment in the affected departments, but this decrease has been more than offset by the increase in employment in the E.D.P. sections, thus leading to an increase in total employment. Of the 24 organisations analysed, in eight there was a reduction of 547 persons out of a total of 6,690, i.e. about 8 per cent. In the remaining 16, the number employed increased by 900, i.e. by about 12.3 per cent. On an average, the employment in the departments affected by computerisation declined by 5.3 per cent. Taking into account the increase in the E.D.P. sections, the net increase was of the order of 2.4 per cent.

3.22. It would appear that but for the increase in the data processing sections, employment would have been adversely affected to a great extent. One reason for the increase in the E.D.P. departments could be that in most cases, it is not a one to one transfer of work from the U.R.M. to the computer, but many new applications were taken up of the computer which increased the need for more personnel. This was only to be expected as it was often the growing volume of work and the inadequacy of the existing U.R.M. system to cope with it that led to the introduction of the computer. Further, with the versatility and capacity of the computer available, the management could think of taking up and doing many more jobs which they could not take up earlier for want of sophisticated tool like the computer.

3.23. In the case of educational and research organisations where the computers were utilised purely for scientific and educational and other research purposes, computerisation of work is reported to have had no adverse effect on the existing employment; in fact, more new jobs have been created, mainly in the computer departments. In Government Departments also, except in one case, computerisation did not result in any change in the existing employment in the departments whose work was

computerised; at the same time the creation of the E.D.P. departments gave scope for fresh employment.

3.24. The Works Study Team on Automation (Maharashtra State) which also attempted to study the trends in 'Office' and 'clerical' employment in 14 undertakings which had introduced computers, came to the conclusion that, "between 1965 and 1969, in the Manufacturing Organisations, total office employment increased from 7,728 to 10,794 *i.e.* by 3,066 or 39.7 per cent, while the clerical employment increased from 2,787 to 3,557 *i.e.* by 770 or 27.6 per cent only. . . In the Marketing and Distribution sector, the total office employees declined from 4,376 to 4,135 *i.e.* by 241 or 5.5 percent; while the clerical employment was reduced from 2,010 to 1,605 *i.e.* by 405 or as much as 20.1 per cent. . . . In the Transport Undertakings, total office employment increased from 1,50,349 to 1,51,684 *i.e.* by 1,335 or by 0.9 percent only. The clerical employment declined from 16,051 to 14,656 *i.e.* by 1,395 or 8.7 per cent. . . . In the Banking and Insurance, the office employment rose sharply during these four years from 15,221 to 19,213 *i.e.* 3,992 or 26.2 percent, while the clerical employees increased from 13,398 to 15,747 *i.e.* 2,349 or by 17.5 percent. Thus, the total office employment of all the 14 organisations under study increased from 1,77,674 to 1,85,826 *i.e.* 8,152 or 4.6 per cent. The clerical employees also showed an increase from 34,246 to 35,565 *i.e.* by 1,319 or 3.8 percent, though, however, the ratio of clerical to the total office employees declined slightly from 19.3 percent to 19.1 percent *i.e.* by 0.2 percent over the period of four years or by 0.05 per cent on an average per annum."*

3.25. Considering that the changes in total office employment and total clerical employment may have been due to several factors such as business expansion, increase in volume of work, changes in method and system etc. and cannot be attributed solely or even mainly to the introduction of computer, the Study Team cautioned that "the trends reflected in the analysis should be understood to be only indicative and not conclusive."

3.26. Resistance to computers is based not only on fears of job loss of existing employees, but also on the issue of loss of potential employment, *i.e.* that it will reduce to employment prospects of new entrants in the labour market. Here again,

*Report of the Works Study Team on Automation (Office Automation in Maharashtra State, pp. 82-86.

widely differing views have been expressed. The employers' organisations in general have held the view that it is a misconception to say that introduction of computers will reduce employment potential in the society generally, though in the short run it may result in the displacement of certain types of labour, such as semiskilled and unskilled labour in individual industries, this is because, at the same time, it increases employment opportunities for certain other categories, viz., skilled and educated technical personnel. In the long-run, employment potential is bound to grow in the society in general with the resultant increase in production and efficiency leading to the growth and expansion of new and ancillary industries as is borne out by the history of technological development all over the world. Some of the central organisations of workers, on the other hand, have argued that automation reduces employment potential at the unit level and adds to the already acute unemployment by creating problems of redundancies, redeployment, etc. Even in the short-run, it certainly results in the reduction of the number of jobs, though not necessarily in the displacement of existing employees. In the long-run it might be possible to provide additional employment in new industries, etc. but it is doubtful whether the additional employment thus created will offset the loss of jobs in the industries effected by computers. According to one of the central organisations, automation reduces employment not potentially but actually and creates employment in one direction only, viz., computer making industry. The new employment provided in this industry and in units where computers are installed hardly compares with the employment reduced by automation. However, through the expansion of a unit or by other methods like stoppage of recruitment, adjustment against normal wastage or attrition, it is possible to ensure that no retrenchment takes place. Some employees' organisations have stated that if the use of automated equipment is restricted to sophisticated applications and jobs which are not otherwise done, it need not affect the existing or potential employment.

3.27. Among the reasons given for a 'no reduction in the staff' after automation, as also for an 'increase in staff', were : (a) increase in the volume of work consequent upon improvement in business, and (b) the use of computer for work which was not done earlier. Even in those units where there was a reduction in the number of employees in the concerned departments after computerisation, it was stated that there was no retrenchment and that all the surplus staff was absorbed either in the newly created E.D.P. departments or in other departments of the organisation. Of the four government departments using

computers which replied to our questionnaire, only one reported a reduction in the staff strength of the computerised department, the others reporting 'no change'.

3.28. On the other hand, fresh jobs, generally of a more skilled nature, were created in the E.D.P. (Computer) Departments. Even in cases where the U.R.M. system was earlier in use, the personnel such as punch operators, machine operators, etc. were transferred to the new E.D.P. sections. New jobs like system analysts, programmes, etc. were created. In most cases the surplus staff in the sections affected by computerisation could be absorbed, after some training, in the E.D.P. departments. The other methods of re-adjustment have been absorption of the surplus labour force against natural wastage, separation and in some cases by offering early retirement benefits. Where a unit has been an expanding organisation, the problem of re-adjustment was greatly facilitated.

3.29. The works Study Team on Automation (Office Automation) in Maharashtra State collected detailed information on methods of adjustment of displaced staff from six units.* Table below gives the information collected by them.

TABLE VII
Method of adjustment of displaced staff in the organisation

S. No.	Type of organisation	No. of organisations reposting	Absorbed in expansion	Provided alternate jobs	Retrained & put in the computer section	Absorbed elsewhere in organisation	Total
1	2	3	4	5	6	7	8
1	Marketing & Distribution	3	1 (0.9)	15 (13.9)	21 (19.4)	71 (65.8)	108 (100.0)
2	Transport	1	—	150 (100.0)	—	—	150 (100.0)
3	Banking & Insurance	2	45 (9.3)	366 (75.8)	72 (14.9)	—	483 (100.0)
TOTAL :		6	46 (6.2)	531 (71.7)	93 (12.5)	71 (9.6)	741 (100.0)

*Op. cit. pp. 106-107.

The Table "provides a somewhat interesting picture of the method of adjustment of 741 employees who were displaced from their jobs in six E.D.P. Establishments . . . only 46 employees or 6.2 per cent of the total were absorbed in expansion activities, while as many as 531 or 71.7 per cent—the largest share—of the total were provided alternate jobs. 93 employees, constituting 12.5 per cent of the total were retrained and put in the computer section itself, and the remaining 71 persons or 9.6 per cent of the total were absorbed elsewhere in the organisation".

3.30. It was brought to our notice by a number of parties particularly unions that the mere fact of no retrenchment or a slight increase in the numbers in the E.D.P. departments is no proof that there has been no shrinkage in employment; firstly, considering the present largely increased volume of work, the number of employees required to do it on the older methods would have been much larger than the number currently employed in the E.D.P. section. Secondly, the employees rendered surplus by the computers were adjusted in vacancies arising out of natural wastage; which in other words meant that the total number of jobs had decreased. In order to find out the extent of the loss of job opportunities as a consequence of computerisation, a study was made in three undertakings covering a few items of work which are currently done on computer but which were earlier done manually or on U.R.M. Of the three, one belongs to the banking industry, the other is in electricity undertaking and the third is an insurance company. (For details please see Appendix XV). On the basis of these studies the figures of number of employees engaged in certain applications before and after computerisation as also the estimated number required if the work were continued to be done on the old system, are given in the following table :

TABLE VIII
Manpower requirements before & after computerisation

Establishment	Number of employees doing the work		Estimated number required if work were done on old system
	Before computerisation	After computerisation	
1	2	3	4
A . . .	380	304	516
B . . .	150	151	165
C . . .	9,380	7,420	11,121
	(Man hours)	(Man hours)	(Man hours)

3.31. It is seen that the loss of job opportunities due to computerisation of the job works out to 212 in Unit A, 14 in B, and 3,701 man-hours in C. These estimates have been arrived at by calculating the manpower requirements for the present volume of work involved in different applications if done by old method minus the actual number of employees presently doing the work with the aid of computer. It should, however, be noted that the extent of loss of job opportunities would depend on a number of factors such as the nature of the activity, the extent of the coverage of applications, the stage of development of the computerisation programme, the volume of work and also whether in a particular job any new elements have been introduced or not. Some of these are amenable to evaluation and some are not. As such, figures of the loss of job opportunities need to be read with caution.

3.32. Although there was no direct retrenchment of labour due to introduction of computers, there was reduction in the number of jobs available in the concern immediately, since the vacancies resulting from natural wastage were filled by adjusting surplus employees from computerised departments. This has naturally resulted in a reduction in fresh recruitment of the affected categories. Thus, if one ignores the indirect and long-term consequences of automation and its role in accelerating economic growth and resultant increases in job opportunities in the economy as a whole, the immediate impact of the computer is the reduction in the demand for clerical employees. The findings of the Works Study Team on Automation (Office Automation) in Maharashtra State are somewhat similar. It came to the conclusion that "some applications of automation displace labour; our survey, however, reveals that those who were displaced or rendered surplus were generally absorbed in alternative jobs or in the expansion scheme of the undertakings; in the process, however, some job opportunities might have been lost"*.

III

IMPACT ON WAGES, CONDITIONS OF WORK, PROMOTION PROSPECTS ECT.

3.33. Another area in which automation/computers are expected to lead to changes is that of wages and conditions of work. In regard to wage changes, whether or not such changes

*Op. cit. p.181.

occur will largely depend on factors such as the shifts in the categories of employees before and after computerisation, the number recruited from outside and the levels at which they are recruited, etc. The experience of other countries which have had considerable experience of computers seems to indicate that no general conclusion can be drawn on the impact of computerisation on the pay level of the workers. An I.L.O. Study* levels that there is little comprehensive information on which to base a conclusion about the effects of automation on the pay of non-manual workers but on the cases of whatever information there is, suggests that no strong impact has been evident. Generally whatever increases have occurred in the average level of pay have been brought about by reduction in the proportion of low paid jobs rather than by a substantial increase in the pay of many employees.

3.34. The information obtained by us in the case studies and in evidence reveals that computerisation has led to the creation of new types of jobs, many of them in the higher categories. In the E.D.P. departments new categories of highly qualified and better paid jobs such as System Analysts, Programmers, etc. have emerged; there has, however, not been any appreciable rise in the pay packets of the clerical employees as a result of computerisation. Taking the E.D.P. section as a whole, it would appear that staff employed in the computer sections, such as punch operators, programmers, etc. received their higher scales of pay as compared to those of the clerical staff previously engaged in the work. To the extent that most of the computer staff were recruited from within the organisation and given training, several existing employees got the benefit of better jobs and better pay due to the introduction of computer. Even where the staff such as key-punch operators were transferred from the U.R. Machine to the computer section they were given some additional allowance. It was also brought to our notice that, although the overtime work increased in the early stages of computerisation due to simultaneous working in the experimental stages, the overtime work and hence overtime earnings have come down considerably once the work was fully computerised. It was stated in a number of cases that the large increase in the volume of work had necessitated regular overtime working in certain sections; and inspite of regular overtime the work used to be in arrears; but with computerisation the overtime bill has come down and the arrears cleared.

*I.L.O. : Labour & Automation; Bulletin No. 5; "Automation & Non-Manual Workers; 1967. p. 16.

3.35. There is no evidence to show that as a result of introduction of computers the hours of work have either increased or decreased. However, in order to make the most efficient use of computers, some clerical workers are now having to work on second and third shifts, a practice associated usually with blue-collar jobs. In regard to the physical working conditions it has been observed that because the E.D.P. equipment can work only in an air-conditioned atmosphere, the conditions in which some E.D.P. section employees work have improved. The working conditions of other employees of the E.D.P. section, generally have remained the same as before. "The work environment and the conditions of service in the E.D.P. departments were by and large, more congenial to better work performance, in that the work has become somewhat simpler and calls for substantially higher skill requirements, particularly for computer programmers and system analysts". A point made, particularly by union representatives, was that computerisation has created more stress and strain on the clerical staff as now they have to be very careful and ensure accuracy and also work with a greater speed and to predetermined time-schedules.

3.36. With the introduction of the computer, some jobs in certain departments whose work is taken over by automated equipment become surplus; even if there is no retrenchment, the individuals involved may have to be transferred to other departments of the same unit or even to outside stations; or they may have to be trained to perform new duties and new functions; the nature of work may undergo certain changes and the ratio between supervisory posts and posts at lower levels may be disturbed thus jeopardising the promotion prospects of individuals; the changed requirements of skills for higher posts may erode the equities earned by employees over years of consistent service. On the other hand, it may open up new avenues for higher and technically qualified in-services personnel to reach higher levels or, in an expanding organisation particularly service industries, surplus staff may be absorbed on jobs similar identical to his former job and a minimal dislocation may be caused.

3.37. Several employees' organisations have emphasised that the computer disturbs the traditional office employment to the disadvantage of the lower categories; that by rendering most of the middle level office supervisory jobs superfluous,

*Report of the Works Study Team on Automation (Office Automation) in Maharashtra State—p. 180.

the computer takes away the already limited 'promotion avenues open to lower grade clerical employees. Federations representing railway employees in particular brought to our notice that as a result of computerisation promotion prospects have been drastically reduced and that the idea of 'shadowposts' designed to safeguard the existing promotion prospects, has not worked well. The employers, on the other hand, have emphasised that as a result of the created of E.D.P. department more new jobs in higher grades have been created, of the E.D.P. department more new jobs in higher grades have been created thus increasing the promotion prospects for qualified office staff. In regard to issue of 'shadow posts', the Railway Administration has pointed out that these 'shadow posts' were meant to protect the existing promotion posts for the employees and not to enhance them; they claimed that the scheme has been working quite well, barring any particular instances which can certainly be looked into on their merits. The unions also contend that there is always a decline in the number of positions in the middle level which arise from the simplification and reorganisation and centralisation of work following automation.

3.38. According to the information available there seems to be no noticeable change in the conventional hierarchical structure; this may be because most of the computers installed are still at the experimental stage and the managements are not yet in a position to reduce some of the middle management supervisory posts immediately after the installation of computer. At the same time, there is evidence to show that the ratio of clerical to supervisory posts has been disturbed. In fifteen of the nineteen commercial undertakings for which such information was available, the ratio of clerical to supervisory staff decreased. However, in two units the ratio remained constant and in another two it increased. Coming to requirements of clerical and supervisory staff application-wise in service undertakings, in six out of seven units, the ratio of clerical to supervisory increased in favour of supervisory cadre. This may be due to larger recruitment at higher levels necessitated by computerisation. In manufacturing undertakings, the trend is a mixed one. This to some extent negates the unions' claim that promotion prospects viewed in totality have come down as a result of computerisation. It may, however, be true for individual employees, particularly the aged ones who are in no position to acquire the new skills required in the new jobs. It offers greater avenues for the technically qualified or those having the basic academic qualifications to take up the changed pattern of work with minor training, while others may lose the chance to higher promotions.

3.39. The question of transfers out of station as a result of introduction of automation at the head offices was also looked into by us. It would appear that the managements have generally tried to avoid such transfers without the consent of the affected employees. The agreements between the employees and the managements, governing introduction of computer, specifically provide that no out-of-station transfer will be made. It is also one of the assurances given by the Railway Board to its employees that no employee will be transferred out-of-station without his consent. In a banking establishment having branches throughout India, the introduction of the computer at its head office, would have meant the wholesale transfer of a few hundred employees engaged in that work at a different location. The management by agreement with the union gave the option to the employees whether they would like to be transferred to the station where E.D.P. department was established or would remain where they were. Only a handful of employees preferred to be transferred and most of them were adjusted at their place of duty, and at the head office almost the same number were recruited afresh.

IV

IMPACT ON FINANCIAL WORKING

3.40. We have seen that among the objectives mentioned for computerisation are : improvement in efficiency, improvement in quality of product/service and reduction in cost. All of these benefits, it is claimed, will result in a better financial working of the unit and increased profits, etc.

3.41. We have looked into this matter carefully. We feel that it will be far-fetched and wrong to attribute changes in the financial working, profits, etc. of undertakings to a not too significant factor like introduction of a computer for data processing. Profits, costs of production, productivity, etc. are dependent upon a number of factors both internal and external. Apart from the production processes and the nature of technology used, the level of efficiency of the management and the state of labour-management relations have an impact ; similarly the general economic situation in the country, the fiscal and monetary policies adopted, the level of taxation, the availability or otherwise of materials, etc. impinge on the general profitability of concerns. Thus, although computerisation may

have resulted in a general improvement in the functioning of the undertaking thereby contributing to better financial results, it would be difficult to attribute, much less to quantify, on the basis of statistics, any improvement or slackening in the profits, levels of inventories, turn-over, etc. to the impact of computerisation. One can, perhaps, only make a generalisation that computerisation as a management tool may render benefits which are largely intangible in most cases, but add to the general efficiency of the undertaking and consequently to its profitability.

3.42. Although the impact of computerisation on the general financial working of the undertaking is at best indirect and not exactly measurable, several instances have been brought to our notice, wherein the introduction of the computer has helped the undertakings to effect considerable money savings, by enabling a better utilisation of the resources, more effective check on inventories, a better scheduling of machine time and production, quicker realisation of dues etc. For instance, an engineering concern reported a saving of Rs. 5 crores in inventories, in spite of a larger turnover, through the adoption of inventory models which was possible only with the help of a computer. Several other organisations, both in the public sector and in the private sector have claimed that the use of the computer has enabled them to improve and rationalise their system of inventories and to effect considerable reduction in the inventories. The Indian Railways have reported a saving of Rs. 20 crores per annum on inventories by the use of computerised techniques. A leading cement company claimed that it had affected a saving of Rs. 2/- per tonne of cement produced. An electricity undertaking is said to have achieved a saving of Rs. 50 lakhs a year on inventories. Another electricity distribution undertaking which computerised its billing system has claimed that this has enabled them not only to realise the dues much quicker than before, but also to drastically reduce the outstandings. A leading company in the cement industry has claimed that by using PERT and L.P. techniques on the computer they were able to cut down on the scheduled commissioning time of a new cement project by nearly two months thereby saving a sum of Rs. 20 lakhs. A number of undertakings manufacturing a variety of components and articles have reportedly been able to cut down on production time and achieve optimum utilisation of the machines and equipment by adopting production planning and control through the computer.

3.43. Cost-reduction :Against the claim that computerisation helps in the improvement of the general efficiency and working

of the concern, it has been said that computerisation of most items of work only leads to an increase in the cost of doing them and that if the work were continued to be done as before, it would be much less costly than doing it on the computer. In order to study this, issue, be collected detailed data on this aspect from three undertakings. The findings are given in the table below :—

TABLE IX
Cost of applications before and after computerisation

Est- abl- ish- ment	Application	Before comput- erisation	After comput- erisation	Estimat- ed cost if the work were done on old system
1	2	3	4	5
		Rs.	Rs.	Rs.
A	(1) Branch clearance (per entry)	0.14	0.11	0.15
	(2) Government Accounts (per entry)	0.15	0.17	0.17
B	(1) Inventory control etc. (transac- tion)	0.83	0.49	0.71
	(2) Pay roll (per worker)	3.29	6.87	4.79
	(3) Billing (per bill)	0.46	0.39	0.41
	(4) Costing (job)	8.27	10.16	8.57
	(5) Defaulting customers list (Con- sumer)	0.09	0.014	0.006
C	(1) Premium & Loans Interest bill- ing (1000 Nos.)	238.22	201.24	Not Avail- able
	(2) Renewal Commission (1000 Nos.)	735.32	719.98	Do.
	(3) Bonus Commission (1000 en- tries)	60.79	41.29	Do.

3.44. It will be seen that the effect of computerisation on cost has varied between units and also as between applications. In unit (A) computerisation reduce the cost in the important area of branch clearance, but not in that of government accounts. In both these areas, the cost of doing the job on the old system

would have been higher. In unit (B) the position is mixed. Computerisation has been economical in some jobs and costlier in some others. Some variations exist in regard to the relative costs of doing the work on computer and as per old methods. In unit(C) a reduction in cost is indicated in the various applications. Judging by these data, one may perhaps conclude that the justification for computer does not lie mainly in the reduction of costs; if at all, it may lie in other considerations.

V

IMPACT ON INDUSTRIAL RELATIONS

3.45. The most important aspect of the social effects of computerisation is that on the employer-employee relations. The experience of developed countries like U.S.A., U.K., West Germany, Sweden, Japan, etc. where advanced technology has played a very important role in the industrial processes, the introduction of the computer does not seem to have led to any serious industrial relations problems. A recent I.L.O. report on effects of automation in offices* states that "the spread of automation has provoked little industrial conflict, and the unions concerned have practically all accepted technical innovation and adopted a constructive attitude towards it". The report, further states that "direct action over automation in the form of strikes or go-slow action was almost entirely unknown". Reasons are not far to seek. Their attitude was conditioned by the prevalence of full employment or near-full employment in these economies coupled with high rates of economic growth. The trade unions in these countries also had a strong collective bargaining base. The unions, therefore, concentrated their efforts on securing a fair share of the fruits of automation to the members. To achieve this end, the unions have been placing reliance on government programmes and collective bargaining. In the process, the unions and management have been able to build healthy conventions on the introduction of automation.

3.46. During the short period since the introduction of computers in India, the workers'/unions' attitudes have gone through the phases of out-right hostility and opposition to

*I.L.O. : Labour & Automation, Bulletin No. 5, p. 104.

acquiescence or adjustment to change subject to some check and safeguards. As computers were introduced in most cases without consultation with the workers' unions, this has often led to relate apprehension and suspicion. There have been instances of the unions totally opposing introduction of computers and there have been instances where such introduction was accepted without protests; there have also been instances wherein unions have tried to accept the change on the basis of consultation and undertaking with the management and subject to provision of safeguards against the adverse effects of computerisation; such safeguards usually covering, 'no retrenchment', 'no loss of wages' and 'sharing of gains'; which particular attitude prevailed depended on a variety of factors in a given situation.

3.47. The introduction of advanced technology and computers in India has been a relatively recent development. Problems of technological change and rationalisation which have been agitating the minds of Indian labour for quite some time were discussed at tripartite forums more than once. The Model Agreement to guide employers in regard to Rationalisation was adopted by the 15th Indian Labour Conference in 1957. Modernisation of existing industries, and introduction of automatic equipment in industries like cotton and jute textiles has come to be governed by the provisions of this Agreement. Although there have been complaints about its inadequacy particularly due to its having no legal backing, the Agreement has been fairly successful in regulating the introduction of rationalisation and modern equipment. समयमव नयन

3.48. The advent of computerisation over a decade ago, with its possible consequences on the employment aspects of the workers and the serious apprehensions it aroused in the minds of the working class, has given rise to a rethinking and a renewed opposition to technological change in the form of automation and computers. Until 1965 when only a few computers in commercial units had been installed, their introduction did not arouse much opposition. An attitude of serious opposition developed since 1965 largely as a result of suspicion created in the minds of the employees of a big public sector undertaking by the decision of the management to introduce a computer in one of its offices without prior consultation with the workers. A concerted agitation against the introduction of computers has developed on the ground that in the socio-economic conditions prevalent in the country use of computers in offices would aggravate the existing unemployment and should therefore be completely

banned. Most of the central trade union organisations have lent support to this agitation. The atmosphere of doubts and apprehensions has been such that despite assurances given by the managements in the form of 'no retrenchment guarantees', 'no' reduction in the pay packet', 'protection of promotion prospects, etc, unions have opposed the introduction of computers on grounds of loss of potential employment.

3.49. Managements have generally held that computerisation is an aspect of their organisational set-up and as such the decision whether to introduce a computer or not is within the realm of normal management decision making; that there is, therefore, no need for prior consultation with employees or their unions. They concede, however that unions are legitimately concerned with any repercussions that the introduction of the computer may have on the employees—their job security, conditions of service, working conditions, wages, etc., and that the managements are ready to negotiate with the unions to deal with such matters. On the other hand, trade unions have argued that the decision to computerise is not a simple matter of organisational set-up, but an issue of significance which has very far-reaching consequences and affects the employment prospects and conditions of the workers and as such it should be incumbent on managements to consult them and get their prior consent before finally deciding to instal a computer. While managements consider that it is one of the modern tools for improving overall organisational efficiency, unions have considered it more as a method used by the management to reduce the work force, than as a genuine tool for improving overall efficiency.

3.50. The available information on this aspect seems to suggest that managements in most cases had introduced computer without prior consultation with the unions. The following Table gives an industry-wise summary indicating the number of units in each industry where computer was introduced as a result of unilateral decision by the management or on the basis of consultation with the workers/unions.

TABLE X

Union consultation in introduction of computer

Industry	Computer introduced					
	Without prior consultation			With prior consultation**		
	Public Sector	Private Sector	Total	Public Sector	Private Sector	Total
1	2	3	4	5	6	7
1. Textile . . .	—	4	4	—	—	—
2. Engineering . .	7	3	10	—	1	1
3. Chemical & Chemical Products .	—	1+(1)*	2	—	—	—
4. Cement . . .	—	1	1	—	—	—
5. Petroleum . . .	—	2+(1)*	3	—	1	1
6. Electric Supply .	—	—	—	—	2	2
7. Air Transport . .	2	—	2	—	—	—
8. Railways . . .	11	—	11	—	—	—
9. Banking . . .	—	—	—	1	—	1
10. Insurance . . .	1	—	1	—	—	—
11. Others . . .	1	—	1	—	2	2
TOTAL . . .	22	11+(2)*	35	1	6	7

*indicates cases in which agreement was reached subsequent to introduction of computer.

**In three cases, (reference cols. 5-6) one in public sector and two in private sector, tacit consent of unions was obtained before computerisation and written agreements in the other four.

3.51. It is seen that in most cases (83.3%) many of these public sector concerns, computers were introduced by the managements without prior consultation with the employees or their unions. Some of the reasons adduced by the managements for not consulting the unions were that : (a) the management considered this matter to be purely within their decision making competence; (b) they were afraid that the unions will refuse to cooperate with the decision; (c) they were only substituting the computer for the existing Unit Record System and therefore, did not consider it to be any fundamental change from the existing methods or procedures; (d) there was no recognised union

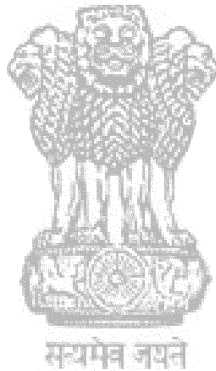
to be consulted and (e) it would be enough if the employees/unions are informed of the managements' decision in due course. Sixteen out of the thirty-five units have stated that they kept the unions informed about installation of the computer. Some of these have stated that they had not only informed their unions about introduction of computers, but also gave them assurances against retrenchment, transfer, etc. No instance was brought to our notice in which a proposal to instal a computer was dropped due to disagreement with union.

3.52. Only in the case of seven units (one in the public sector and six in the private sector) there was prior consultation with the unions about installation of the computer. Formal agreements between managements and the unions were entered into only in respect of four units—all of them being in the private sector. In the case of the other three, though there was no formal agreement covering this issue, the tacit consent of the unions appears to have been obtained. The agreements entered into by management with the unions generally contain the following provisions :

- (a) No worker will be laid off on account of the switch-over to the computer. Surplus staff, if any, will be absorbed in other departments;
- (b) Remuneration of the employees will be protected;
- (c) There will be no reduction in senior posts so as to ensure that the promotion prospects are not adversely affected;
- (d) Retraining facilities will be provided to the employees to make them suitable for new posts;
- (e) Vacancies caused by the natural wastages will be filled through recruitment of surplus staff;
- (f) No out-of-station transfers will be made without consent of the persons concerned; and
- (g) Workload on any workman will not exceed a fair normal day's output.

In one of the agreements (in the public sector) it has been provided that the management would consult the unions, every-time it wanted to extend the computerisation to any new application.

3.53. It is clear that wherever consultation preceded introduction of automation and the employees or their unions were taken into confidence the process of the introduction and its working has been quite smooth; in units where the unions were ignored in arriving at the final decision to introduce the computer, difficulties arose, particularly where the workers were well-organised. Once such suspicions are created, it is very difficult to dispel them. Although no details regarding the number of disputes raised or the number of mandays lost on account of work stoppage connected with this demand are available, it has been evident that during the last few years this issue has created considerable unrest particularly among white-collar employees and their unions.



CHAPTER IV

A POLICY FOR COMPUTERS—RECOMMENDATIONS

In the light of the evidence before us, and on the examination of the various considerations for and against the use of computers, we have come to the following conclusions regarding the criteria and considerations which, in our opinion, should govern the use of computers in the present stage of social-economic development of our country.

4.1. For purposes of laying down any general criteria determining specific areas or fields in which use of computers may be permitted or restricted, it seems appropriate to make a distinction between use of computers by (a) educational, scientific and research institutions, statistical organisations of the Central and State Governments and defence establishments, and (b) commercial and industrial establishments (whether in the private or public sector) including consultancy services. The need and desirability of the use of computers in category (a) are generally agreed to subject to reasonable provisions to protect employment and working conditions. We, therefore, recommend that, subject to reasonable provisions to protect the existing employment and ensuring proper working conditions, the use of computers by educational, research and scientific institutions (non-profit making), statistical organisations of the Central and State Governments and defence establishments should be permitted. We should make it clear that we do not include in these categories the research and development divisions of business and industrial establishments, whether in the private or public sector, and also consultancy firms where research is done primarily for the use of managements of particular commercial and industrial establishments.

4.2. The use of computers in category (b), namely by commercial and industrial establishments whether in the public or private sector, including consultancy services has to be treated differently and several additional considerations must be taken into account. We have carefully considered whether we could

lay down general criteria determining specific applications for which the use of computers by such establishments may be permitted or restricted and have come to the conclusion that this would not be possible. Factors favouring and not favouring the use of computers for particular applications differ greatly between different establishments. Therefore, rather than laying down general criteria for this purpose, we suggest that the case for the use of computers by commercial and industrial establishments should be examined and scrutinized for each establishment separately by a panel of experts taking into account all relevant considerations.

4.3. In our opinion, the legitimate and proper use of computers in commercial and industrial establishments is as an aid to management for improving its efficiency which could not be achieved otherwise. Though there is a general agreement on this point, evidence before us shows that, in a number of cases, the computers are currently being used mainly for routine jobs which could as well be done manually or with mechanical aids including unit-card system. Alternatively, the computer installations have remained under-utilized. It is possible that this is because the use of computers in our country is still new and the management of many establishments are not yet equipped and experienced to make full and proper use of the computers for this legitimate purpose. It is also possible that use of computers for management decisions requires the data to be brought in a form which makes it inevitable that certain operations or jobs which could as well be otherwise performed have to be computerised. This is a matter which will require close scrutiny of each case separately. But it seems to us that in many cases the present underutilisation or improper use of existing computers is mainly due to the fact that computers have been installed without sufficient justification, thought and adequate preparation and planning for their legitimate use. We emphasise that in future this practice will have to be prevented.

4.4. One method to ensure full and proper use of computer installations as an aid to management, is to provide computer facilities in computer service centres accessible to commercial and industrial establishments, both public and private, including consultancy firms for legitimate applications. Creation of such facilities will (a) ensure full utilisation of computer installations as such computer service centres will execute approved jobs received from numerous establishments, (b) avoid installation of in-house computers in small firms where there is not

enough work-load for a computer and thus will prevent under-utilisation or misuse of computer installations, (c) enable larger establishments to use computer on an experimental basis, to explore its full potentiality as management aid, (d) provide facility to professional computer scientists engaged in consultancy work and development of software, and (e) provide facilities for training and education in computer technology. We, therefore, recommend that adequate computer service facilities in appropriately located computer service centres should be created to meet the demands for approved uses.

4.5. As we have conceived it, a computer facility is in the nature of a public utility or an infra-structure facility and hence we feel that, as far as possible, it should be created in the public sector. However, if for any reason it does not become possible to provide adequate computer facility in the public sector, computer service centres in the joint sector, failing which in the private sector, may be allowed subject to appropriate licensing and regulation regarding their use.

4.6. Even after adequate computer service facilities are created, there may be cases where individual commercial and industrial establishments may need in-house computers of their own. The justification of such in-house computers will have to be (a) operational difficulties in the way of these establishments using the available facilities of the computer centres, and/or (b) because of the volume of work of approved use, the ability of these establishments to make full and proper use of the in-house computers. Such cases will have to be carefully examined and scrutinized individually by a panel of experts.

4.7. Whether the commercial and industrial establishments use the computer centre facilities or instal in-house computers, the possibility of its adversely affecting the employment has to be kept in mind as a governing consideration. After a careful examination of this question, we have come to the conclusion that the question must be examined at two levels, namely, (a) effect on employment in relation to the whole economy and (b) effect on employment in concerned establishments and particularly in the relevant departments of the establishments. As for (a) namely the effect on employment in relation to the whole economy, it seems to us that the considerations here are similar to those involved in the use of mechanisation, rationalisation and in general in the progressive use of advanced and capital-intensive technology. This is a matter which must obviously

be covered by a general policy on technology. So far as the use of computers is concerned, we think that, within the general framework of the policy on technology, the necessary decisions must be taken on the basis of relevant considerations at the level of individual establishments concerned. As for (b) namely the effect on employment in the concerned establishments and particularly in the relevant departments, we think that, besides the examination and scrutiny of the question by a panel of experts, it is essential that the concerned workers are satisfied that their employment and working conditions will not be adversely affected. We, therefore, recommend that all use of computers by commercial and industrial establishments, whether by resort to the computer centre facilities or by installation of in-house computers should be subject to a prior agreement with the workers.

4.8. We may thus summarise the criteria and considerations which, in our opinion, should govern the use of computers by commercial and industrial establishments : (a) all such proposals should be examined and scrutinized, case by case, by two experts (as provided in para 4.14) who will take into account all relevant considerations; (b) use of computers for unapproved purposes and under-utilization of computer installations should be prevented; (c) as far as possible, the needs of computer use should be met from computer centre facilities to be created preferably in the public sector; and (d) in all cases, the use of computers should be subject to a prior agreement with the workers.

4.9. In order to meet the above considerations, we recommend that in all future uses of computers by commercial and industrial establishments whether in public or private sector, the following procedure should be adopted:

4.10. If the management of a commercial and/or industrial establishment desires to use computer for an application which is of a casual or non-repetitive nature, it may send the job directly to an approved computer centre and inform the workers accordingly. If the workers have any objections, they may raise them with the management. If a dispute arises, either party may take the matter to the National Bipartite Machinery referred to in para 4.17 below.

4.11. If the management of a commercial and/or industrial establishment desires to use computer for applications which

may be of repetitive nature, the management should prepare a Justification Report giving justification for the use of the computer and making clear whether resort to a computer centre facility or installation of an in-house computer is desired.

4.12. Where resort to a computer centre is desired, the Justification Report to be prepared by the management should detail the following :

- (i) the broad types of data from the establishment which will be sent to the computer centre;
- (ii) the kind of analyses to which the data will be subjected;
- (iii) the periodicity of each type of application whether occasional, daily, weekly, monthly, quarterly or annual;
- (iv) the reasons why the jobs cannot be done without resort to a computer.

4.13. Where installation of an in-house computer is desired, the Justification Report to be prepared by the management should detail the following :

- (i) the reasons why the same could not be done through existing computer centre facilities;
- (ii) specifications and estimated prices (or rentals) of the machines proposed to be installed;
- (iii) the types of applications, with their periodicity, which will be handled by the proposed computer installations;
- (iv) the benefits to be expected as regards improvement in efficiency, quality, cost reduction, economy, etc.;
- (v) likely effects on the employment in the establishment and particularly in the relevant departments;
- (vi) likely effects on conditions of employment, promotion prospects, working conditions, wages, etc. of the concerned workers;
- (vii) methods of adjusting employees rendered surplus, if any; and
- (viii) safeguards to protect the workers' interests, including the method of sharing possible benefits.

4.14. The Justification Report by the management should be referred to a panel of two experts for evaluation, assessment and comments. The experts should be selected, jointly by the management and the workers, from a panel of experts having sufficient knowledge of computer technology, maintained by the government for this purpose. The experts, either on their own or at the instance of the parties, may call for any additional information. The report of the experts should be advisory and should not have the effect of arbitration.

4.15. The Justification Report by the management together with the experts' report on the same should form the basis of the negotiations between the management and the workers. Whoever may represent the workers in general in such negotiations, care should be taken to ensure that the workers likely to be affected by computerisation are also appropriately associated.

4.16. If, as a result of these negotiations, an agreement is reached between the management and the workers on the use of computers, the same should be permitted according to the terms of the agreement. If the agreement is for the use of the facilities of a computer centre, it should be the responsibility of the computer centre to ensure that the particular data and applications sent to it by the management from time to time are in accordance with the agreement. It will be obligatory on the part of the centre to furnish, at the request of the workers, information in regard to the types of jobs being done. In case of violation of any agreement and failure to agree mutually, the dispute may be referred by either party, to the National Bipartite Machinery provided in para 4.17.

4.17. In case, no agreement is reached between the management and the workers, the matter should be referred to a Bipartite machinery at the national level, comprising representatives of the employers and trade unions. The National Bipartite Machinery should be composed of equal number of members representing employers and employees, to be nominated by the all-India organisations of employers and trade unions represented in the Indian Labour Conference. The Justification Report prepared by the management and the experts' report on the same will form the basis for the consideration of the Machinery. It shall hear the parties concerned and may take the opinion of other experts, if considered necessary. The recommendations, if unanimous, will be binding. In cases where there is no unanimity, the matter must return to the establishment level.

4.18. We have so far considered how new computer installations may be regulated. In the light of our recommendations, we have to consider an appropriate policy in regard to the existing computer installations. As we have mentioned, in some cases, the computers have been installed after appropriate consultation and agreement with the workers. By and large, these installations have been working smoothly. In other cases, disputes have arisen and while in some cases, these have been settled satisfactorily, some of the disputes are still active. It is obvious that these disputes as also any which may arise in future should be resolved satisfactorily. We think that the National Bipartite Machinery referred to in para 4.17 above, is the appropriate agency to settle such disputes. We, therefore, recommend that all present and future disputes in relation to the working of the existing and future computer establishments would be referred to the National Bipartite Machinery.

4.19. From our recommendations for future computer installations, it follows logically that all expansion of capacity of the existing installations should be governed by similar considerations and procedures. We, therefore, recommend that all future expansion of capacity of the existing computer installations whether by installation of additional computers or by replacement of the old computers by improved ones, should be subject to the same procedure as recommended in paras 4.13 to 4.17 above for future computer installations.

4.20. In conclusion, we should say that our approach to the problem of the use of computers is positive : while we have emphasised the need for appropriate regulation of the use of computers in the present stage of social-economic development of the country and safeguards to prevent its adverse effects, we do recognize certain legitimate uses of computers in education, science, research, statistics and defence as also in commercial and industrial establishments. Consistent with this approach, we recommend that steps should be taken to ensure that the legitimate needs of the country in this field, both in hardware and software, be met as far as possible from indigenous sources. This will not only help in reducing imports and thus saving of foreign exchange but, by creating fresh avenues of employment, will also help to offset, at least partly, any possible adverse effects of computerisation on employment. It will also make possible development of research and training of skilled manpower in the field of computer technology and more generally in the field of

electronics. We understand that the Department of Electronics is seized of the matter of ensuring self-reliance in this vital field.

ACKNOWLEDGEMENTS

In the course of our enquiry we received considerable assistance and co-operation from the State Governments, employers' and workers' organisations and others. The Appendices VI to VIII contain the list of organisations/persons who helped us during the course of our enquiry in various ways. We wish to express our thanks to them all. We are particularly grateful to the State Labour Departments for their help in making necessary arrangements during our visits for recording oral evidence. Our thanks are also due to the Employers' Federation of India, Bombay and their staff for the courtesy and facilities extended by them for the Committee's meetings in Bombay.

The onerous task of organising the programmes of the Committee and making the necessary arrangements for its tours and meetings, as well as the preparation of the background material and papers for our consideration was very ably performed by the Committee's Secretariat. The credit for this goes to the Secretary of the Committee and the team of devoted staff who assisted him. We would like to place on record our appreciation of the excellent work done by Shri M.A.M. Rao, Secretary of the Committee who bore the brunt of the work cheerfully and with competence. His considerable experience of work of committees and commissions and knowledge of labour and economic problems proved to be an asset to us in the discharge of our task.

We also wish to acknowledge the services rendered by the other officers of the Committee, particularly Dr. (Miss) Kamala Mathur, Deputy Director and Shri B.N. Kacker, Assistant Director. The staff at the junior level—the Economic Investigators, Stenographers, Assistants, and the Class III and Class IV staff—gave of their best and our thanks are due to them.

We will be failing in our duty if we do not acknowledge the services rendered by Shri R. Venkataraman who, as Chairman of the Committee till his resignation in March, 71, gave direction to the Committee's work. We also wish to place on record our appreciation of the contribution to the Committee's work which

Shri Bagaram Tulpule made while he was a Member. We are also grateful to all the Alternate Members of the Committee for the active interest shown by them in the Committee's work and the excellent cooperation that we received from them.

(Sd.) V.M. Dandekar
Chairman

(Sd.) G. Ramanujam.

(Sd.) Ram Desai.

(Sd.) Satish Loomba

(Sd.) B. D. Somani

(Sd.) Babubhai M. Chinai

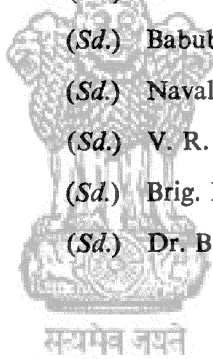
(Sd.) Naval H. Tata

(Sd.) V. R. Rao

(Sd.) Brig. B. J. Shahaney

(Sd.) Dr. B. S. Garud.

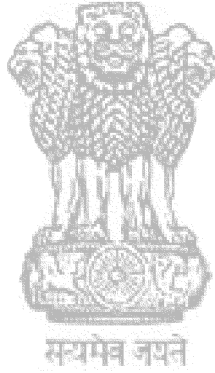
Dated : 18-5-72



EXPLANATORY NOTES

By

	PAGES
1. Shri Satish Loomba }	i—ii
2. Shri G. Ramanujam	iii—iv
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EXPLANATORY NOTE

by

SHRI SATISH LOOMBA

Whether Automation including computerisation is beneficial or not to the working-class and the people as a whole depends on the character of the social economy, in which it is sought to be resorted to.

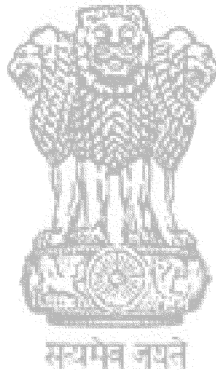
2. In a socialist system automation is wholly beneficial to the people and an instrument of progress. It leads to higher accumulation of capital for planned investment. It multiplies the speed of production and distribution of social wealth, lowers prices to the consumer, shortens the working day, and reduces the workload, provides more free time for leisure and culture, leading to a richer, better and higher social order, which must be the main aim of the scientific and technological revolution, of which automation is one part.

3. But in a capitalist society where all economic activity in the sphere of production and distribution is dominated by the sheer pursuit of maximum profit, automation is used to increase exploitation of workers without leading to any social benefit. The ownership of capital is in the hands of monopolies, and the large houses which alone are in a position to instal computers, and automation, and advances of technology is geared not to curbing prices but maximising profits. Jobs become few, unemployment grows and the work and fatigue loads mount.

4. In view of this, the trade unions and workers in India, where the overwhelming area of economic activity is controlled by private capital have to adopt an overall attitude of opposition to automation in general. Hence the monopolists and larger houses are spurred on to the use of higher technology by the desire to maximise their private profits. Hence, the use of the scientific and technological revolution in India will not deal to abundance of production, fall in prices and better standards of

living and work but will inevitably lead to increasing unemployment, greater workload and fatigue—as is the experience of all the advanced capitalist countries like in the U.S.A., U.K., etc. Only the socialist countries show the contrary phenomenon. And India is not yet a socialist society.

5. In spite of these considerations I have agreed to the recommendations of the Committee as a practical policy at the present juncture. •



EXPLANATORY NOTE

by

SHRI. G. RAMANUJAM

To the question whether automation is desirable, the answer is 'yes' and 'no'. For it depends on various factors, including the context and the manner in which automation is resorted to.

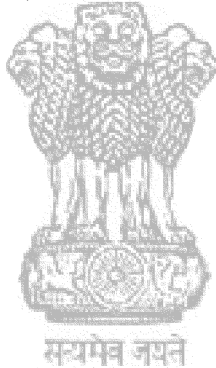
2. Unemployment and under-employment are major problems facing our country. Automation, including computerisation, can reduce both actual and potential employment. It can rob labour of its personality, creative effort, sense of achievement and drag down work itself to boredom.

3. Some of these evils could be mitigated if the rate of economic growth is rapid enough to absorb the shocks and surpluses of such automation. Whether such a high rate of rapid economic growth is possible in our country under our present socio-economic system is the first question. If such progress is to be made possible, whether we can ignore or turn indifferent towards harnessing modern technological development is the next question. If then, we should take advantage of the latest technological development, should it not be done in such a manner as might not further strengthen the hold of the monopolists on the economy is the third question.

4. It has also to be borne in mind that a mere higher rate of economic growth is no guarantee of an all-round progress, particularly of the poor and un-organised masses. The real progress would lie in the equitable distribution of the national product among the people as a whole, particularly the poor, in both the rural and urban areas. Relief to this section of the population should come in the form of full employment and how far automation will help such employment among the unorganised and rural population is also a relevant consideration. All these questions have weighed with me while coming to our conclusions on the question of automation.

5. The highly selective approach in the matter of installation and use of computers coupled with safeguards, such as workers' prior consent and the operating of the computers service centres in the public sector, have largely guided by decision to sign the report along with my colleagues. Also the hope now generated among the masses by the new radical policies and programmes of the Government, aiming at a new democratic socialist order of society, which could ensure that automation is not allowed to become yet another tool in the hands of the employers so that the rich become richer and the poor poorer, is another reason for my signing this report along with my colleagues.

6. In view of these considerations, I have agreed to the recommendations of the Committee as a practical policy at the present juncture.



EXPLANATORY NOTE

by

**SHRI NAVAL H. TATA
SHRI BABUBHAI M. CHINAI**

&

SHRI B. D. SOMANI

OUR APPROACH

The Indian economy is characterised by labour surplus on the one hand and insufficient capital accumulation on the other. The problems of unemployment and under-employment have to be tackled as part of economic development, and more importantly, as part of the social objectives that the nation has set for itself.

2. Industry is one of the critical sectors for generating additional employment. Its growth, therefore, has to be consciously fostered, particularly because a great leeway has to be made good. In the context of generating employment in industry, the following are necessary :

- (a) Timely acquisition and use of technology that will ensure maximum output which, in turn, will lead to reduction in costs, check prices and create larger investible surplus in the hands of enterprises, government or people.
- (b) Self-reliance to the extent possible in technology.
- (c) Ensuring that the introduction of technology does not have a disturbing effect on the labour already employed.

3. These considerations are relevant to the use of computers also. Despite what can be said to the contrary, computerisation has no different consequences or effects other than the introduction of any new machinery. If anything, the adverse effect of computerisation on employment is negligible, and the benefit to industry and society is immense.

4. At this stage, it may be pertinent to record that the evidence before us does not support the contention that there has been a great amount of reduction in employment as a result of the introduction of automation/computers. We made an attempt to estimate the potential for the introduction of computers in commercial and industrial establishments and the possible effects that it may have on the employment situation. It will be seen from the Report that, in general, only companies having a paid-up capital of Rs. 1 crore or more can afford to have their own computer installations. Since the number of such companies registered under the Companies Act as on 31-3-1968 was 445, and assuming that 50% of these companies would install their own computers, the total number of computers to be installed would be 223, of these 94 having already been installed. On the basis of the number of employees affected by the introduction of computers so far, as found in the Report, i.e. about 16 per computer, it will be seen that the total number of employees that would be affected would be about 2,064, and that too over the next decade and more. The above figures are not intended to be precise estimates, but to indicate the magnitude of the so-called unemployment that is likely to result even if the introduction of computers is permitted without any check or hindrance. They are, at the least, sufficient to dispel the exaggerated apprehensions entertained by some sections of the trade unions.

5. We believe that basically a computer is an aid to better management, an essential tool in R & D, and a means to improve the quality of work. It is a neutral agent, and its advantages are evident in all economic structures, whether developed or developing, whether centrally controlled or mixed.

6. Computers in India have not been put up on any large scale. Even so, computers have evoked considerable emotional reaction among trade unions. Therefore, we believe that the introduction of computers should be preceded by a better understanding between management and labour involved at the plant level. This understanding cannot be achieved through a formal framework of do's and don't's. It is entirely a matter of human relationships and, consequently, a process of trial and error. Trade unions as well as managements, both in the public and private sector enterprises, must beware of the dangers and contradictions implicit in formal controls. All of us have experience in India of a control system and its adverse consequences on production as well as employment.

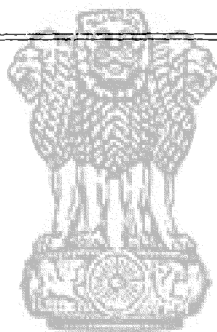
7. When even the tradition-bound agricultural sector is fast awakening to the possibilities of scientific innovations, it is but appropriate that the pace of development of modern industry in India should not be allowed to slacken for any reason. Moreover, the need for economic self-reliance demands that Government should encourage the industrial sector to use the most efficient production and management tools including computers by provision of adequate computer service facilities as a public utility. It is also urgently necessary to marshal the local talent and resources to produce computers and such other equipment indigenously. Indigenous production of computer equipment will have the added advantage of generating new employment simultaneously with acquisition of the technical know-how relevant to automation.

8. The workers in India have never been seriously opposed to technological progress in the past. Such opposition would be obviously pointless at present when the industrial relations system in the country has been modified to provide a greater measure of job security and adequate safeguards for the just rights of workers. We are accordingly confident that the workers will develop a more balanced and informed attitude in respect of computers and automated processes in general.

9. We have, however, agreed, despite many reservations we have had, to the procedures laid down in this Report, for the introduction and use of computers. In doing so, we have had only one objective in mind, viz., to promote technological development through a process of persuasion and consent, rather than through coercion. We carry no mandate from our constituents. But the success of our recommendations would very largely depend on voluntary bipartite negotiations that may ensue on the basis of this procedure, and the extent to which both parties give and take in the national interest of preserving industrial peace, in making available to our country, a vital tool of management for our economic survival. Let us hope that neither side will exploit the procedure laid down in a narrow outlook for short-term benefits for the worker or the management.

10. We have agreed to the recommendations of the Committee as a practical policy at the present juncture.

APPENDICES



सत्यमेव जयते

APPENDIX-I

MINISTRY OF LABOUR, EMPLOYMENT & REHABILITATION

*(Department of Labour & Employment)

RESOLUTION

New Delhi, the 19th July, 1969

No. 31/7/68—LRIV—The socio-economic effects of the introduction of automation measures in industry, commerce, administration and other related fields have recently been the subject of a good deal of debate in the country. It has been urged that automation reduces employment potential in individual industries and occupations ; on the other hand it has been argued that automation is part of the modern technological progress, is indispensable for industrial and economic development and helps to create new industries and expand existing industries in a manner which would not be possible without automation. Certain export oriented industries have also pleaded that, without automation, they cannot compete in foreign markets with manufacturers from other countries which place no restrictions on automation. Government's policy in this regard has been that automation could be introduced but on a selective basis and that technological advance should be regulated to make it consistent with the social good of the community. The criteria which determine such selectivity need to be more clearly defined, and for this purpose the Government have decided to set up a committee.

2. The Committee will consist of the following:

CHAIRMAN

Shri R. Venkataraman—Member, Planning Commission.

MEMBERS

- (1) Shri G. Ramanujam
- (2) Shri Bagaram Tulpule
- (3) Shri Satish Loomba
- (4) Shri B. D. Somani
- (5) Shri Babubhai M. Chinai
- (6) Shri Naval H. Tata
- (7) Prof. V. M. Dandekar, Gokhale Institute of Economics & Politics, Poona.
- (8) Prof. V.R. Rao, Computer Centre, Delhi.
- (9) Brig. B. J. Shahaney, Instrumentation Ltd., Kotah.
- (10) Dr. B. S. Garud, General Manager, Shriram Fertilisers

3. The following will be the terms of reference of the Committee

- (1) To review the total effects of the operation of automation in the enterprises in the public and private sectors in which it has been already introduced.
- (2) To recommend criteria for the determination of any specific areas and fields in which introduction of measures of automation including computers, may be permitted or restricted with due regard to:
 - (i) the need for raising efficiency and productivity in industry and trade, and in particular industries which are export-oriented ;
 - (ii) the requirements of scientific research and development ;
 - (iii) the need for the timely tabulation, analysis, study, etc. of the large masses of data that arise in modern industry, trade, transport, etc.; and
 - (iv) the need for restricting the import of foreign equipment for automation and for encouraging the use of such equipment manufactured in the country.
- (3) To recommend safe-guards for avoiding or minimising any harmful social effects of the introduction of automation.
- (4) To consider and make recommendations on any other related matters.

4. The Committee is requested to submit its report within a period of one year.

ORDER

ORDERED that the Resolution be published in the Gazette of India Part I Section (I).

ORDERED also that a copy of the Resolution be communicated to all Ministries/Departments of the Government of India, State Governments/ Administration of Union Territories and all other concerned.

No. 31/7/68-LRIV

P. M. NAYAK

Secretary

APPENDIX-II

(To be Published in Part I Section (I) of the
Gazette of India Extraordinary)

GOVERNMENT OF INDIA

(BHARAT SARKAR)

Ministry of Labour and Rehabilitation
(Shram Aur Punarvas Mantralaya)

Department of Labour and Employment
(Shram Aur Rozgar Vibhag)

Dated New Delhi, the 24th July, 1971.

RESOLUTION

In Government of India Resolution No. 31/7/68-LRIV published in the Gazette of India Extraordinary dated the 19th July, 1969 a Committee on Automation was constituted with Shri R. Venkataraman, Member Planning Commission as its Chairman. Shri R. Venkataraman has since tendered his resignation from the Chairmanship of the Committee and his resignation has been accepted by the Government. Government hereby appoint Prof. V.M. Dandekar, Director, Gokhale Institute of Economics & Politics, Poona as Chairman of the Committee on Automation.

Sd./-

P. M. NAYAK

Secretary to the Government of India

U-23025/1/71-LR-IV

ORDER

ORDERED that the Resolution be published in the Gazette of India, Part I Section (I).

ORDERED also that a copy of the Resolution be communicated to all Ministries/Departments of the Government of India, State Governments/ Administration of Union Territories and all Members.

Sd./-

(P.M. NAYAK)

Secretary to the Government of India

APPENDIX-III.

(To be Published in Part I Section (I) of the
Gazette of India Extraordinary)

GOVERNMENT OF INDIA

(BHARAT SARKAR)

Ministry of Labour and Rehabilitation
(Shram Aur Punarvas Mantralaya)

Department of Labour and Employment
(Shram Aur Rozgar Vibhag)

Dated New Delhi, the 8th December, 1971.

NOTIFICATION

Shri Bagaram Tulpule, nominee of Hind Mazdoor Sabha, was appointed as a member of the Committee on Automation constituted *vide* Government of India Resolution No. 31/7/68-LRIV, published in Part I Section (I) of the Gazette of India Extraordinary dated the 19th July, 1968. He has since tendered his resignation and Government hereby accepts his resignation from the membership of the Committee and appoints his alternate Shri Ram Desai as a regular member of the Committee.

Sd./-

(R. ANANDAKRISHNA)

Joint Secretary to the Govt. of India.

(No. U-23025/4/71-LRIV)

To

The Manager,
Government of India Press,
Faridabad.

सत्यमेव जयते
ORDER

ORDERED that the Notification be published in the Gazette of India Extraordinary, Part I Section (I).

ORDERED also that a copy of the Notification be communicated to all Ministries/Departments of the Government of India, State Governments/ Administrations of Union Territories and all concerned.

Sd./-

(R. ANANDAKRISHNA)

Joint Secretary to the Govt. of India.

APPENDIX-IV
GOVERNMENT OF INDIA
MINISTRY OF LABOUR, EMPLOYMENT & REHABILITATION
(DEPARTMENT OF LABOUR & EMPLOYMENT)

Dated, New Delhi, the 9th December, 1969.

RESOLUTION

No. 31/18/69-LRIV. In the Ministry's Resolution No. 31/7/68-LRIV dated the 19th July, 1969, a Committee on Automation was set up under the Chairmanship of Shri R. Venkataraman. In order to promote the more expeditious despatch of the Committee's business, it has now been decided that each of the employers' and workers' organisations represented on the Committee may nominate one alternate member to attend its meetings on behalf of the principal member during the latter's unavoidable absence.

The following alternate members of the Committee have accordingly been nominated with effect from November 10, 1969, and their membership of the Committee is hereby notified, subject to the condition that only the principal member would sign the Committee's report and that he would be bound by the views expressed on decisions agreed to by his alternate at meetings of the Committee:

Principal Member

1. Shri Naval H. Tata
2. Shri Babubhai M. Chinai
3. Shri B.D. Somani
4. Shri Bagaram Tulpule
5. Shri G. Ramanujam
6. Shri Satish Loomba

Alternate

1. Shri T.S. Swaminathan
2. Shri P. Chentsal Rao
3. Shri S.C. Aggarwal
4. Shri Ram Desai
5. Shri Raja Kulkarni
6. Shri P.P. Patil

ORDER

ORDERED that the Resolution be published in the Gazette of India Part I, Section (I).

ORDERED also that a copy of the Resolution be communicated to all Ministries/Departments of the Government of India, State Governments/ Administration of the Union Territories, Chairman of the Committee on Automation and all others concerned.

No. 31/18/69-LRIV

P.M. NAYAK
Secretary

APPENDIX-V
GOVERNMENT OF INDIA
Committee on Automation
C-107, South Extension, Part-II.
NEW Delhi-49

November 20, 1969.

From

M.A.M. Rao,
Secretary.

To

Subject :—Questionnaire

Dear Sir,

As you are aware, the socio-economic effects of the introduction of automation in industry, trade, commerce, administration and other related fields have recently been the subject of a good deal of debate in the country. To study and report on the various aspects of the subject, the Government of India in the Ministry of Labour, Employment and Rehabilitation have set up the Committee on Automation under the chairmanship of Shri R. Venkataraman, Member, Planning Commission. The composition of the Committee and its specific terms of reference are given in the Government Resolution reproduced in Annexure I.

2. The attached questionnaire comprising a general questionnaire and two supplementary questionnaires (A) and (B) seeks to elicit information and views on the various aspects of the subject covered by the Committee's terms of reference. While the general questionnaire is to be answered by Governments, employers' and workers' organisations, and persons interested in or concerned with the subject of automation in general, the supplementary questionnaires are primarily addressed to the managements and employees unions in establishments which have introduced automation. Respondents are, however, free to answer any or all the questions in the relevant questionnaire(s).

3. The Committee would like to complete its work as early as possible. It will, therefore, be appreciated if replies are sent so as to reach the office of the Committee by 15th January, 1970.

The Committee will be grateful if you send 30 copies of your replies.

Yours faithfully,
M.A.M. RAO,
Secretary

COMMITTEE IN AUTOMATION

I—General Questionnaire

- I. Name and address of the respondent :
(State/organisation/undertaking/person)
- II. The name of the Central Organisation of employers/workers to which you are affiliated.
- III. If union, please give the number of members. When was the union formed?
- IV. If an undertaking/establishment, please give :
 - (a) Commodity produced/nature of activity.
 - (b) Number of employees as on 1-12-1969:
 - (i) Workers
 - (ii) Others
 - (c) When was the undertaking established?

-
1. What in your view constitutes automation* as distinct from mechanisation ? To your knowledge, what are the areas in which automation has been introduced in the country?
 2. Would you make a distinction between automation in manufacturing and automation in offices ? If yes, give reasons.
 3. What are the factors in our socio-economic environment which favour the introduction of automation and what are the factors that militate against its introduction?
 4. Do you think that automation is necessary/feasible in the context of national economic policies, particularly in regard to :
 - (i) employment,
 - (ii) industrialisation,
 - (iii) raising productivity and production,
-

*From the point of view of the Committee's work, particularly study of the total effects of the introduction of automation, the scope of the term 'automation' may be restricted to technical advances involving the use of automatic machinery, incorporating automatic transfer systems or integration, automatic control or feed-back and the use of computers. It would not cover (i) simple automation involving introduction of automatic machines covering a single process only and (ii) introduction of more modern machines or higher degree of mechanisation.

- (iv) raising standards of living, and
- (v) export promotion.

5. Do you agree with the view that automation reduces employment potential in individual industries, occupations and in the society generally and adds to the already acute unemployment by creating problems of redundancy, redeployment, etc. ? Please give reasons.
6. Do you agree with the view that automation as a part of the modern technological progress is indispensable for industrial and economic development and helps to create new industries and in expanding existing industries in a manner which would not be possible without automation ? In particular that it helps to :

- (i) raise efficiency,
- (ii) reduce the cost of production/services,
- (iii) accelerate the rate of economic development,
- (iv) create employment opportunities particularly for educated and higher skilled personnel,
- (v) benefit the consumer by way of lower prices,
- (vi) benefit workers through higher emoluments, and
- (vii) improve the employer's competitive capacity in the international market.

7. Have you had experience of automation? Specify whether it is in office or manufacturing. Please give on the basis of your experience your views on the impact of the introduction of automation on :

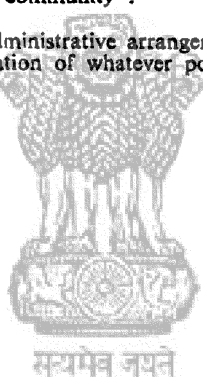
- (i) production and productivity,
- (ii) costs of production/services—labour costs, other costs,
- (iii) profits,
- (iv) structure of organisation,
- (v) employment,
- (vi) working conditions,
- (vii) emoluments, and
- (viii) labour-management relations.

8. Taking into consideration the total socio-economic conditions in India and our commitment to economic development, what, in your view, should be our public policy on automation ? In particular, would you favour either of the following policies or suggest any other :

- (i) Automation could be introduced, but on a selective basis and technological advance should be regulated to make it consistent with the social good.
- (ii) Ban automation, except where it is intended to perform tasks that cannot be manually performed at all, or where some other equally compelling reason makes automation unavoidable.

9. (a) If you favour alternative 8 (i) above, and if automation on a selective basis is considered permissible, what should be the criteria that should determine such selectivity ?
- (b) For instance, would you be in favour of permitting/restricting the introduction of automation ;
- (i) in traditional, old industries/establishments employing a large number of workers ;
- (ii) in industries/establishments which cannot expend production/services to absorb workers displaced by automation either because of a limited market or because of restrictions on expansions ;
- (iii) in industries which are export-oriented and in which improvement of efficiency and quality and reduction of cost to competitive levels have to be given the utmost priority ;
- (iv) in institutions of scientific research and development ;
- (v) to facilitate timely tabulation, analysis, study, etc., of the large mass of data that arise in modern establishments, industry, trade, transport, etc. ;
- (vi) in cases where it helps the management in its task of decision and design making ;
- (vii) in certain establishments where an intermediary stage of advanced technology has already been reached and introduction of automation would not lead to any significant redundancy of labour force ;
- (viii) where the management and the representative union agree on its introduction ; or
- (ix) in any other situation you may like to suggest.
- (c) Please list out the specific industries/areas in which you would like automation to be permitted.
10. If you favour alternative 8 (ii) above, please spell out what you would deem to be the factors necessitating adoption of automation.
11. Would you favour introduction of automation in the above or other fields, irrespective of whether the equipment/machinery is imported or indigenously manufactured ? Or only if it is indigenously manufactured and there is no drain on foreign exchange resources ?
12. For avoiding or minimising any harmful effects of the introduction of automation, can the agreement on rationalisation adopted at the 15th Session of the Indian Labour Conference* be extended to cover automation as well ? If not, what modifications or alternative plan you would like to suggest in relation to automation ?
13. Do you think that the following measures would help avoid or minimise any harmful social effects of the introduction of automation :
- (i) prior consultation/agreement with the workers' representatives;

- (ii) gradual phasing of the change-over to automation ;
 - (iii) provision for voluntary retirement (under proper safeguards) with enhanced benefits ;
 - (iv) absorption of surplus labour in other departments of the same unit or by transfers to other units under the same employer ;
 - (v) reduction of working hours in the establishments to absorb some surplus labour ;
 - (vi) protection of emoluments, promotion prospects, etc.
14. Will you prefer that in case it becomes absolutely essential to retrench certain minimum number of persons, a higher rate of compensation in lieu of absorption in the same unit be provided ?
 15. Can you recommend any scheme to share the gains resulting from introduction of automation taking into account the interests of the workers, the industry and the community ?
 16. What legislative and administrative arrangements would you suggest for effective implementation of whatever policy you advocate in regard to automation ?



COMMITTEE ON AUTOMATION

II. Supplementary Questionnaire (A)

(To be answered by establishments which have introduced automation)

I. General

1. (a) Name of the Unit
- (b) Address
- (c) Year of establishment
- (d) Products/Services
- (e) Number of workers employed (As on 1-7-1969):
 - Managerial
 - Administrative and Supervisory
 - Office
 - Production
 - Maintenance
 - Others

II. Introduction of Automation

2. What has been the nature of automation introduced in your unit :
 - (i) Office automation,
 - (ii) In manufacturing process,
 - (iii) Computer based or non-computer based.
3. What are the departments and areas of work and operations which have been automatised ? Please specify.

Deptt.

Operation/
processes

Office

Manufacturing

4. What was the motivation for introducing automation :
 - (i) improvement of quality of product/service,
 - (ii) increase of output,
 - (iii) to facilitate scientific research and development,
 - (iv) reduction of time-lag in tabulation and analysis of data,
 - (v) to facilitate management decision-making,

- vi) reduction of labour costs,
- (vii) others.

5. (a) When was automation introduced in your concern ?
 (b) What was the time-lag between your decision to instal computer automatic equipment and completion of installation ?
 (c) What was the time taken for the completion of change over of work to automated process ?
6. (a) If it is computer-based, please specify the make and model.
 (b) If it is non-computer based, please indicate :
 (i) the type of machinery/equipment,
 (ii) the processes automatised.
7. Is the computer/automated equipment imported from abroad or is it indigenously manufactured ?
8. Is the computer/authomated equipment purchased or hired ?
 (a) If purchased :
 (i) Total cost,
 (ii) Actual cost of maintenance.
 (b) If hired :
 (i) Rental,
 (ii) Actual cost of maintenance.
9. If the computer/automated equipment was purchased,
 (i) was it paid for in rupees or foreign exchange ?
 (ii) was any element of subsidy involved ? If so, by whom was the subsidy given ?
10. Is the type of computer/automated equipment installed in your unit currently under production by the original manufacturers or has it become obsolete and the production stopped ?
11. Is the computer being used for your work only or for the work of others also ?
12. If only for your work, is its capacity being fully utilised ?
13. What is the computer 'on time' per day ?
14. What kind of ancillary services are provided by the suppliers of the equipment e.g., programmer education, user education, service programming, consultancy in problem formulation and analysis and so on ?

15. (a) Was automation introduced on the basis of :
- (i) unilateral decision by management ? or
 - (ii) in consultation with the workers' representatives/union(s).
(Please mention names of unions consulted).
- (b) if (a)(ii), please indicate at what stage consultations were held.
Please supply a copy of the agreement.

III. Economic Effects

16. Has there been any change, due to the introduction of automation,
- (i) in production capacity,
 - (ii) in actual production,
 - (iii) in per capita production,
 - (iv) in unit cost,
 - (v) in labour cost per unit,
 - (vi) in per capita investment,
 - (vii) in quality of product/services ?
- (Wherever possible, please give data for two years before and for two years after the change-over to automation).
17. Have any new products/services come out as a result of automation which would not have been possible without automation ?
18. What are the economics effected as a result of the change-over to automation ?

IV. Effects on Employment

19. Was there a prior assessment of the likely effects of introduction of automation on the employment position in the establishment ?
20. Was any plan/scheme of deployment (reabsorption, retraining and transfers) worked out in advance ?
21. Did you have any difficulty in getting the necessary complement of supporting staff (programmers, operators, etc.) ?
22. How many of them did you recruit from outside ? How many from within the establishment ?
23. What has been the effect of automation on the work force in the Department(s) concerned ?

	NUMBER OF EMPLOYEES	
	Before automation	After automation
(i) Managerial		

- (ii) Technical/Supervisory
- (iii) Clerical
- (iv) Production workers
- (v) Maintenance
- (vi) Others.

24. (a) As a result of automation, how many old jobs were made redundant ? How many new jobs were created ? Give break-up in both cases, classified according to occupational categories.

OCCUPATION/CATEGORY	NO. EMPLOYED	
	Before automation	After automation

- (b) What was the overall surplus which resulted from the change-over to automation ?
25. What procedure/criteria was adopted in selecting staff for redundancies ?
- (i) Was it on a departmental basis or on an over-all basis ?
 - (ii) What period of notice was given of redundancy to the persons affected ?
 - (iii) Were the redundancies spread over a period of time ?
 - (iv) Was retention on the basis of efficiency and ability, or on the basis of seniority ?
26. Was any agreement reached with the union about procedures that might be necessary for selecting employees for retention or discharge ?
27. Was there occasion for the company to re-engage retrenched staff against any fresh vacancies ?
28. How many for the surplus employees were :
- (i) absorbed in vacancies arising through natural wastage,
 - (ii) induced to retire early through financial aids to retire,
 - (iii) provided facilities for finding new jobs,
 - (iv) given training to fit them into alternate jobs in the computer section,
 - (v) retrenched.

29. What facilities were made available by the company for retraining ?

V. Effects on Wage Levels

30. What arrangements were made to safeguard the earnings of workers and ensure that financial incentives for workers were adequate to gain their support for the changes ?

31. How automation had any effect on incentive systems, particularly individual forms of piece-work ? Please specify.
32. Has there been any re-classification of jobs ? If yes, please give details.
33. How have promotion possibilities of employees been affected ? Please give examples.
34. Please give the average earnings of important categories of workers in the automated departments before and after automation.

Category	Average monthly earnings	
	Before automation	After automation
1.		
2.		
3.		
4.		
etc.		

VI. Changes in Working Conditions

35. What has been the effect of automation on working conditions and condition of employment ?
36. Was there any saving in man hours required through automation ? How was the saving in time adjusted ? Through
 - (i) adjustment of working hours ?
 - (ii) a reduction in regular weekly hours of work ?
 - (iii) longer holidays ?
 - (iv) extension of training ?
37. If there have been variations from traditional office hours, what steps were taken to fully compensate workers for these variations ?

VII. Changes in Social Inter-action

38. What have been the effects of automation on labour-management relations ? Was there any labour unrest consequent upon introduction of automation ?
39. Consequent upon introduction of automation, what have been the changes :
 - (a) in relationship among workers,
 - (b) in relationship between workers and supervisors ?
40. What have been the reactions and attitudes of workers themselves to the process of change and to the new techniques and methods ?

COMMITTEE ON AUTOMATION

III. Supplementary Questionnaire (B)

(To be answered by trade unions in establishments in which automation has been introduced)

1. General Information

- (i) Name of the union
 - (ii) Address
 - (iii) When formed
 - (iv) Name of establishment where functioning
 - (v) Categories/Classes of employees whom it represents
 - (vi) Whether recognised by management
 - (vii) Affiliation, if any
 - (viii) Membership in Unit/Industry.
2. (a) What is the type of automation introduced in the establishment, computer or non computer based?
(b) What are the departments and operations automatised?
(c) When was automation introduced in the undertaking concerned?
 3. What was the union's attitude to the introduction of computer/automated equipment in the unit? If it was opposed to its introduction, please give the reasons. If it was in favour, of what reasons?
 4. Was the union consulted by the management in regard to introduction of automation ; if so, at what stage?
(a) If consulted and agreement reached with the management, please supply a copy of the agreement.
(b) If no agreement was reached, what were the issues of disagreement? What further steps did the union take?
 5. What has been the effect of automation of the work force in the department concerned?

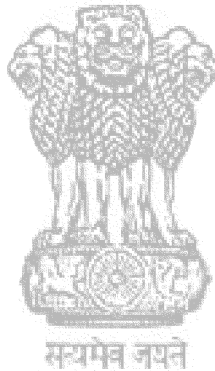
NUMBER OF EMPLOYEES

Before automation	After automation
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- (i) Managerial
- (ii) Technical/Supervisory.
- (iii) Clerical

- (iv) Production
 - (v) Maintenance
 - (vi) Others.
6. As a result of automation, how many of the old jobs were made redundant? How many new jobs were created? If possible give break-up in both cases, classified according to occupational categories.
 7. What procedure and criteria were adopted in selecting employees for redundancies?
 - (i) Was it on a departmental basis or an over-all basis?
 - (ii) What period of notice was given of redundancy to the persons concerned?
 - (iii) Were the redundancies spread over a period of time?
 - (iv) What was the criterion for retention—efficiency and ability or seniority?
 8. Was any agreement reached with the union in regard to points mentioned above?
 9. How many of the surplus employees were:
 - (i) transferred to the new jobs created as a result of automation,
 - (ii) absorbed in vacancies arising through natural wastage,
 - (iii) induced to retire early through financial aids to retire,
 - (iv) retrenched?
 10. What facilities were made available by the company or other agencies for retraining the surplus employees to fit them into new jobs? Did the union render any service in this regard?
 11. Has automation affected the earnings of the employees? If so, in what way?
 12. Has automation had any effect on incentive systems, particularly individual forms of piece work? If so, specify.
 13. Has there been any re-classification of jobs? If yes, please give details.
 14. How have promotion possibilities of employees been affected? Please give examples.
 15. How has automation affected working conditions, particularly hours of work?
 16. If there have been variations from traditional working hours, how are the workers compensated for these variations?

17. What has been the effect of automation on labour-management relations? Did the union call a strike consequent on automation? What specific issues emerging from automation were in dispute?
18. Consequent on automation, what have been the changes:
 - (i) in relationship among workers,
 - (ii) in relationship between workers and supervisors?
19. What have been the reactions and attitudes of workers themselves to the process of change and the automated techniques and methods?



ANNEXURE I

MINISTRY OF LABOUR, EMPLOYMENT AND REHABILITATION

(Department of Labour and Employment)

RESOLUTION

New Delhi, the 19th July 1969.

No. 31/7/68-LRIV—The socio-economic effects of the introduction of automation measures in industry, commerce, administration and other related fields have recently been the subject of a good deal of debate in the country. It has been urged that automation reduces employment potential in individual industries and occupations; on the other hand it has been argued that automation is part of the modern technological progress is indispensable for industrial and economic development and helps to create new industries and expand existing industries in a manner which would not be possible without automation. Certain export-oriented industries have also pleaded that without automation, they cannot compete in foreign markets with manufacturers from other countries which place no restrictions on automation. Government's policy in this regard has been that automation could be introduced but on a selective basis and that technological advance should be regulated to make it consistent with the social good of the community. The criteria which determine such selectivity need to be more clearly defined, and for this purpose the Government have decided to set up a committee.

2. The Committee will consist of the following :

Chairman

Shri R. Venkataraman—Member, Planning Commission.

Members

1. Shri G. Ramanujam.
2. Shri Bagaram Tulpule.
3. Shri Satish Loomba.
4. Shri B. D. Somani.
5. Shri Babubhai M. Chinai.
6. Shri Naval H. Tata.
7. Prof. V.M. Dandekar, Gokhale Institute of Economics and Politics, Poona.
8. Prof. V. R. Rao, Computer Centre, Delhi.

9. Brig. B. J. Shahaney, Instrumentation Ltd., Kotah.

10. Dr. B. S. Garud, General Manager, Shriram Fertilisers.

3. The following will be the terms of reference of the committee :

- (1) To review the total effects of the operation of automation in the enterprises in the public and private sectors in which it has been already introduced.
- (2) To recommend criteria for the determination of any specific areas and fields in which introduction of measures of automation including computers, may be permitted or restricted with due regard to :
 - (i) the need for raising efficiency and productivity in industry and trade, and in particular industries which are export-oriented ;
 - (ii) the requirements of scientific research and development ;
 - (iii) the need for the timely tabulation, analysis study, etc., of the large masses of data that arise in modern industry, trade transport, etc. and
 - (iv) the need for restricting the import of foreign equipment for automation and for encouraging the use of such equipment manufactured in the country.
- (3) To recommend safeguards for avoiding or minimising any harmful social effects of the introduction of automation.
- (4) To consider and make recommendation on any other related matters.

4. The Committee is requested to submit its report within a period of one year.

ORDER

Ordered that the Resolution be published in the Gazette of India Part I Section (1).

Ordered also that a copy of the Resolution be communicated to all Ministries/Departments of the Government of India, State Governments/Administration of Union Territories and all other concerned.

No. 31/7/68-LRIV

P. M. NAYAK, Secy.

ANNEXURE II

RATIONALISATION—THE RECOMMENDATION OF THE FIFTEENTH SESSION OF THE INDIAN LABOUR CONFERENCE (JULY 1957)

The recommendations of the Conference Committee on the subject as adopted by the Conference are as follows :

The Second Five Year Plan stressed the need for promoting increased productivity for the general benefit of the community, the enterprise and the workers. In this context, rationalisation, that is, better utilisation of men, machines and management in industrial undertakings, has assumed great importance. The Committee discussed the content of rationalisation and the procedure to be followed by establishments which proposed to introduce schemes involving higher productivity. It was emphasised and agreed that Government might make arrangements to ensure that measures of rationalisation which did not serve real economic interest in the existing conditions of the country might be avoided. This and what follows would be applicable even in the case of units which have already taken initial steps to introduce rationalisation but have not completed the process. The Committee agreed on the basis provided for this purpose in paragraphs 28 and 29 in the Chapter on Labour Policy and Programmes in the Second Five Year Plan and emphasised particularly that :—

- (i) there should be no retrenchment or loss of earnings of the existing employees i.e. the full complement required for the operations before rationalisation should be maintained except for cases of natural separation or wastage. Workers could, however, be provided with suitable alternative jobs in the same establishment or under the same employer, subject to agreement between the employer and his workers ;
- (ii) there should be an equitable sharing of benefits of rationalisation as between the community, the employer and the worker ; and
- (iii) there should be a proper assessment of work-load made by an expert or experts mutually agreed upon and also suitable improvement in the working conditions :

Subject to the above conditions, the following broad procedure was suggested to smoothen the progress of rationalisation. The union or unions in an undertaking and the employer could enter into a working arrangement on the following lines :—

- (i) the company may seek to make such changes in machinery, lay-out and organisation as it deems necessary for efficient operation of machinery and rational use of labour and material without prejudice to the provisions of any law for the time being in force and subject to the provisions of the working arrangement ;

- (ii) before any such change is effected, the company shall give reasonable notice, ranging from three weeks to three months, to the union(s) of its intention to effect the change. The notice shall be in a form mutually agreed upon and shall contain full information regarding the nature of the proposed change, approximate date of such change, proposed duties for workers concerned and their job assignment and the expected earnings. Where, however, an appropriate procedure for notice of change exists under the current legislation, the same should be observed in preference to the above;
- (iii) the employer shall also furnish information regarding the change and the reduction in the number of jobs and also the effect of the change on the number of jobs in other departments affected by the same change ;
- (iv) the employer and employees shall meet and discuss the proposal as soon as possible after the notice has been given under para (ii) above. The employer shall furnish all information necessary for a complete understanding of the proposed change and shall explain the contemplated change to the union(s);
- (v) the union(s) shall, within a week after the discussion with the employer, present its views or proposals to the employer. If there is agreement, between the parties, the employer may introduce the change on the due date in accordance with the agreement;
- (vi) the union(s) shall be given adequate opportunity to study the new change so as to enable it to gauge the workloads and the earnings of the employees engaged in the operation ; and
- (vii) if there are differences between the parties on any matter covered by this working arrangement, the matters in dispute shall be referred for arbitration or adjudication.

APPENDIX VI

Category wise list of Replies Received

I. Central Ministries/Departments

1. Ministry of Railways,
(Railway Board),
New Delhi.
2. Department of Commercial Intelligence
and Statistics,
Calcutta—1.
3. Central Board of Excise & Customs,
Ministry of Finance,
New Delhi.
4. The Director General,
Government of India,
Overseas Communication Service,
New Delhi.
5. Joint Cipher Bureau,
Ministry of Defence,
New Delhi-22.
6. Additional CDA (ORS),
Defence Accounts Department,
Ministry of Finance (Defence),
Meerut.
7. Office of the Chief Controller of
Imports & Exports,
Ministry of Foreign Trade,
New Delhi.
8. Office of the Development Commissioner,
(Small-scale Industries),
Ministry of Industrial Development,
Internal Trade & Company Affairs,
New Delhi.
9. Telecom. Factories,
P & T Board,
Calcutta-13.
10. Central Silk Board,
Ministry of Foreign Trade,
Bombay-2.

11. Statistical Branch,
(Income-tax),
Directorate of Inspection,
New Delhi-1.

II. State Governments

12. Government of Andhra Pradesh,
Home Department,
Hyderabad.
13. Government of Assam,
Labour Department,
Shillong.
14. Government of West Bengal,
Labour Department,
Calcutta.
15. Government of Bihar,
Department of Labour & Employment,
Patna.
16. Bihar State Industrial
Development Corporation,
Patna.
17. Government of Gujarat,
Education & Labour Department,
Ahmedabad-15.
18. Office of the Industries Commissioner,
Gujarat State,
Ahmedabad-1.
19. Labour Commissioner,
Haryana.
20. Government of Himachal Pradesh,
Simla.
21. The Labour Commissioner,
Trivandrum (Kerala).
22. Government of Maharashtra,
Industrial & Labour Department,
Bombay-32.
23. Office of the Textile Commissioner,
Bombay.
24. Government of Madhya Pradesh,
Labour Department,
Bhopal.
25. Government of Mysore,
Food, Civil Supplies & Labour
Department,
Bangalore.

26. Government of Orissa,
Labour, Employment & Housing
Department,
Bhubaneshwar.
27. Government of Rajasthan,
Labour & Employment Department,
Jaipur.
28. Government of Tamil Nadu,
Labour Department,
Tamil Nadu
Madras-9.
29. Labour Commissioner,
Uttar Pradesh,
Kanpur.
30. Andaman & Nicobar Administration,
Labour Department,
Port Blair.
31. Government of Pondicherry,
Law & Labour Department,
Pondicherry.

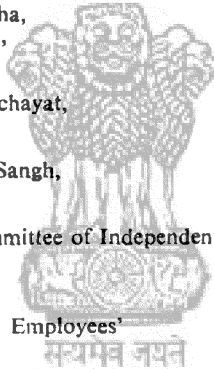
III. Employers Organisations

32. Council of Indian Employers,
Federation House,
New Delhi-1.
33. The All India Manufacturers'
Organisation, Bombay-1.
34. The All India Manufacturers' Organisation,
(The Mysore State Board),
Kasturba Road,
Bangalore-1.
35. The Millowners' Association,
Elphinston Building,
Veer Nariman Road,
Bombay-1.
36. The Cotton Mills Federation,
Elphinston Building,
Veer Nariman Road, Fort,
Bombay-2.
37. Bengal Chamber of Commerce & Industry,
Calcutta.
38. Bengal National Chamber of Commerce
and Industry,
Calcutta-1.
39. Bharat Chamber of Commerce,
State Bank Building,
Calcutta-7.

- 40. Mysore Chamber of Commerce & Industry,
Bangalore-9.
- 41. Indian Engineering Association,
Calcutta-1.
- 42. Indian Engineering Association,
C/o Madras Chamber of Commerce
& Industry.
Madras-1.

IV. Worker's Organisations

- 43. Indian National Trade Union Congress,
Central Office,
New Delhi-1.
- 44. Hind Mazdoor Sabha,
Nagindas Chambers,
Bombay-1 B. R.
- 45. Hind Mazdoor Panchayat,
Bombay-4.
- 46. Bhartiya Mazdoor Sangh,
Bombay.
- 47. Co-ordinating Committee of Independent
Trade Unions,
Bombay-1.
- 48. All India Insurance Employees'
Association,
Calcutta-12.
- 49. All India Railwaymen's Federation,
New Delhi-1.
- 50. National Railway Mazdoor Union,
Seva Sadan,
Bombay-12.
- 51. Indian National Port & Dock Workers'
Federation,
Calcutta-23.
- 52. Port, Dock & Waterfront Workers'
Federation of India,
Bhagat House,
Madras-1.
- 53. All India Petroleum Workers
Federation,
"Shramajee Avaz",
Bombay-15.

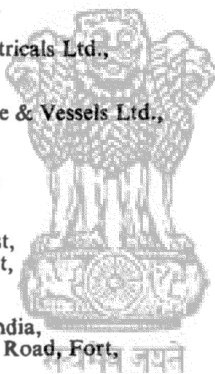


54. Petroleum Employees' Union,
Ismail Building,
Bombay-15.
55. Petroleum Employees' Union,
"Guruswami Buildings",
Madras-1.
56. All India R. M. S. Employees' Union
Class-III, "P & T House",
New Delhi.
57. All India Telegraph Traffic
Ministerial Employees Union,
New Delhi-1.
58. All India P & T Civil Wing,
Non-gazetted Employees' Union,
New Delhi-1.
59. Telecommunication Engg. Supervisors'
Association (India),
Ambala Cantt.
60. P. & T Workshops Engineers Association,
C/o A. G. H. (E), Office of the General
Manager, Telecom. Factories,
Calcutta-13.
61. Indian National Leather Workers'
Federation,
Kanpur.
62. Indian National Mineworkers'
Federation,
Calcutta-20.
63. The Karnatak Pradesh Trade Union
Congress & Bharat Electronics
Employees' Union,
Bangalore.
64. Tamil Trade Union Congress,
Madras-1.
65. Northern Railwaymen's Union,
New Delhi.
66. Indian Oil Employees' Union,
(Southern Branch),
Madras-1.
67. Indian Oil Employees' Union,
(Eastern Branch),
Calcutta-26.
68. Coimbatore District General Workers'
Progressive Union,
Coimbatore.

69. Eastern Railwaymen's Union,
Calcutta.
70. Andhra Cement Company Employees' Union,
Kedareswarapets,
Vijayawada-3.
71. The Estates Staff's Union of
South India,
Coonoor, T. N.
72. Buckingham & Carnatic Mills Staff Union,
Madras-12.
73. Shaw Wallace Indian Employees' Union,
Calcutta-1.
74. Cement Labour Union,
P. O. Jamul Cement Works,
Distt. Durg, (M. P.).
75. Glaxo Laboratories Employees' Union,
Glaxo Laboratories (India) Ltd.,
Bombay-18 (WB).
76. Commercial Intelligence Union,
C/o The Department of Commercial
Intelligence & Statistics,
Calcutta-1.
77. Chittaranjan Locomotive Works,
Labour Union,
Dt. Burdwan.
78. Electricity Mazdoor Sabha, जयते
Ahmedabad.
79. Hindustan Aeronautics Employees'
Association,
Hindustan Aircraft P.O.,
Bangalore-17.
80. Nangal Fertilizer Workers' Union,
Naya Nangal (Punjab).
81. Indian Telephone Industries
Employees' Union,
Bangalore-16.
82. Jamshedpur Division Insurance
Employees' Association,
Jamshedpur.
83. Jamshedpur Mazdoor Union,
Jamshedpur.

V. Central Public Sector Undertakings/Projects/Organisations

84. Air India,
'Nirmal', 241/242,
Backbay Reclamation Road,
Bombay.
85. Bank of India,
Bombay-1.
86. Bank of Maharashtra,
Poona-2.
87. Bharat Earth Movers Ltd.,
Railcoach Division,
Bangalore-17.
88. Bharat Electronics Ltd.,
P.O. Bangalore-13.
89. Bharat Heavy Electricals Ltd.,
Tiruchirapalli-14.
90. Bharat Heavy Plate & Vessels Ltd.,
Visakhapatnam.
91. Bokaro Steel Ltd.,
Bokaro, Bihar.
92. Bombay Port Trust,
Ballard Road, Port,
Bombay-1.
93. Central Bank of India,
Mahatma Gandhi Road, Fort,
Bombay-1.
94. Cochin Dock Labour Board,
Post Box No. 544,
Willingdon Island,
Cochin.
95. Damodar Valley Corporation,
Anderson House, Alipore,
Calcutta-27.
96. Eastern Railway,
Fairlie Place,
Calcutta-1.
97. Heavy Electrical (India) Ltd.,
Bhopal.
98. Heavy Engineering Corporation Ltd.,
Plant Plaza Road, P.O. Dhurua,
Ranchi-4.



99. Hindustan Aeronautics Ltd.,
Indian Express Building,
Vidhana Veedhi,
Bangalore-1.
100. Hindustan Antibiotics Ltd.,
Pimpri, Poona-18.
101. Hindustan Cables Ltd.,
P.O. Hindustan Cables,
District Burdwan.
102. Hindustan Insecticides Ltd.,
Defence Colony,
New Delhi.
103. Hindustan Machine Tools Ltd.,
P.O. H.M.T.
Bangalore-31.
104. Hindustan Steel Limited,
Registered Office, P.O. Nimoo,
Ranchi.
105. India Security Press,
Nasik Road, Central Rly.
106. Indian Airlines,
'Airlines House',
New Delhi.
107. India Government Mint,
Hyderabad-4.
108. Indian Oil Corporation Ltd.,
Bombay-25 DD.
109. Indian Telephone Industries Ltd.,
Dooravani Nagar,
Bangalore-16.
110. Kandla Port Trust,
Post Box No. 50,
Gandhidham (Kutch).
111. Life Insurance Corporation of India.
'Yogakshema', Jeevan Bima Marg,
Bombay-20.
112. Madras Port Trust,
South Beach Road,
Madras-1.
113. Manganese Ore (India) Ltd.,
Nagpur-1.
114. Mining and Allied Machinery Corporation Ltd.,
District Burdwan (W. Bengal).

115. Mormugao Port Trust,
Mormugao.
116. National Coal Development Corporation,
Ranchi.
117. National Productivity Council,
New Delhi-3.
118. National Mineral Development Corporation Ltd.,
New Delhi-24.
119. The National Newsprint & Paper
Mills Ltd.,
Nepanagar (M.P.).
120. Neyveli Lignite Corporation Ltd.,
Post Box No. 1,
Neyveli-1.
121. The Commissioner for the Port of Calcutta,
Calcutta-1.
122. Punjab National Bank,
New Delhi.
123. Reserve Bank of India,
Bombay.
124. Security Paper Mill,
Post Box No. 4,
Hoshangaba
125. State Bank of India,
E.D.P. Centre, Worli,
Bombay-18.
126. M/s Triveni Structural Ltd.,
P.O. Naini,
Allahabad (U.P.).
127. United Commercial Bank.
Calcutta.
128. Visakhapatnam Port Trust,
Visakhapatnam.

VI. State Public Sector Undertakings/Projects/Organisations

129. The Bombay Electric Supply &
Transport Undertaking,
Bombay-1.

130. M.P. Electricity Board,
Jabalpur.
131. The Madhya Pradesh State
Industries Corporation Ltd.,
Maheshwari Bhawan, Civil Lines,
Bhopal-2.
132. The Mysore Iron & Steel Ltd.,
Bhadravati (S. Rly).
133. Travancore Titanium Products Ltd.,
Kochin Veli, Post Box 1,
Trivandrum (Kerala).

VII. Private Sector Companies/Individual Units

134. The Ahmedabad Electricity Co. Ltd.,
Ahmedabad-1.
135. The Ahmedabad Manufacturing
& Calico Printing Co. Ltd.,
(Calico) Mills, Textile Division,
Outside Jamalpur Gate, Post Box No. 12,
Ahmedabad-22.
136. Assam Oil Co. Ltd.,
P.O. Digboi, Assam.
137. The Associated Cement Companies Ltd.,
Bombay-20.
138. The Baroda Rayon Corporation Ltd.,
Udhana (Surat), Gujarat.
139. Bata Shoe Company Pvt. Ltd.,
Calcutta-17.
140. Bengal Chemical & Pharmaceutical Works Ltd.,
Calcutta-13.
141. Binny Limited,
Madras-1.
142. Bombay Suburban Electric Supply Ltd.,
Bombay-55.
143. Brakes India Ltd.,
Padi, Madras.

144. Burmah Shell Oil Storage & Distributing Co. of India Ltd.,
Bombay-1.
145. Caltex (India) Ltd.,
Bombay-1.
146. Consolidated Coffee Ltd.,
Pollibetta—Coorg,
Mysore State.
147. Cooper Engineering Ltd.,
Satara Road, S.C. Rly.,
(Maharashtra).
148. The Delhi Cloth & General Mills Co. Ltd.,
Delhi-6.
149. The Delhi Cloth & General Mills Co. Ltd.,
(Sugar Division), Sanskriti Bhawan,
Jhandewalan,
New Delhi-55.
150. Dhrangadhra Chemical Works Ltd.,
Bombay-1.
151. Dunlop India Ltd.,
Calcutta-16.
152. Escorts Ltd.,
Faridabad.
153. Esso Standard Eastern Inc.,
Bombay-20 BR.
154. Ferro Alloys Corporation Ltd.,
Shreeramnagar P.O. Garividi S. E. Rly.,
Srikakulam District (A.P.).
155. Formica India Ltd.,
Chinchwad,
Poona-19.
156. Glaxo Laboratories (India) Ltd.,
Bombay-18 W.B.
157. Greaves Cotton & Co. Ltd.,
Bombay-1 (BR).

158. Hindustan Motors Ltd.,
P.O. Uttarpara, Hooghly,
West Bengal.
159. IBM World Trade Corporation,
Nehru House,
New Delhi-1.
160. India Pistons Ltd.,
'Nusur Gardens', Sembian,
Madras-11.
161. Indian Cable Co. Ltd.,
Golmuri P.O.,
Jamshedpur-3. (Bihar).
162. Indian Copper Corporation Ltd.,
P.O. Moubhandar, Bihar.
163. Indian Explosives Ltd.,
Calcutta-16.
164. Indian Oxygen Ltd.,
Calcutta-53.
165. The Indian Steel & Wire Products Ltd.,
P.O. Indranagar,
Jamshedpur (Bihar).
166. The Indian Tube Co. Ltd.,
Calcutta-16.
167. The Indian Tube Co. Ltd.,
Jamshedpur.
168. International Computers (India)
Pvt. Ltd.,
Bombay-1.
169. Kalyanpur Lime & Cement Works Ltd.,
P.O. Banjari,
Distt. Shahabad, Bihar.
170. Kamani Engineering Corporation Ltd.,
Bombay-70.
171. The Kinnison Jute Mills Company Ltd.,
Titaghar, W. Bengal.
172. *Kirloskar Electric Co. Ltd.,
Bangalore-3.
173. Kirloskar Oil Engines Ltd.,
Elphinstone Road, Kirkee,
Poona-3.
174. Lakshmi Machine Works ,Ltd.,
Coimbatore Dt.

175. Motor Industries Co. Ltd.,
Bangalore-30.
176. Muir Mills Co. Ltd.,
Civil Lines,
Kanpur.
177. Mysore Cement Ltd.,
Ammasandra P.O.
Jumkur, District Mysore.
178. Ram Kumar Mills Pvt. Ltd.,
Bangalore-2.
179. M/s. Senapathy Whiteley Pvt. Ltd.,
Bangalore.
180. Seshasayee Industries Ltd.,
Vadalur Post,
Tamil Nadu.
181. Shaw Wallace & Company Ltd.,
Calcutta-1.
182. *Shree Vallabh Glass Works Ltd.,
Vallabh Vidyanagar, Anand,
Gujarat.
183. The Sirpur Paper Mills Ltd.,
Sirpur-Kaghnagar (S.C. Rly.),
Andhra Pradesh.
184. Sundaram Clayton Ltd., Padi,
Madras-50.
185. Swadeshi Cotton Mills Company Ltd.,
Kanpur-1.
186. T.V. Sundram Iyengar & Sons Pvt. Ltd.,
Madurai.
187. Tata Consultancy Services,
'Narimal',
Bombay-1.
188. Tata Engineering & Locomotive Co. Ltd.,
Bombay House,
Bombay-1.
189. The Tata Iron & Steel Co. Ltd.,
Jamshedpur.
190. Tinplate Co. of India Ltd.,
Golmuri P.O. (Bihar).
191. Union Carbide India Ltd.,
P.O. Box 533
New Delhi

192. Usha Martin Black (Wire Ropes) Ltd.,
Tatisilwai,
Ranchi.
193. W.S. Insulators of India Ltd.,
'Dhun Building',
Madras-2.
194. Wheels India Ltd.,
Madras-6.

VIII. Academic, Research & Technical Institutions

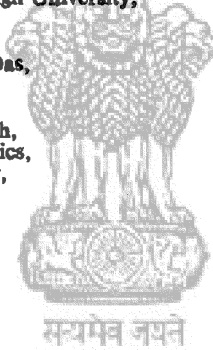
195. The Director,
Bombay Labour Institute,
Parel, Bombay-12 DD.
196. Calcutta Metropolitan Planning
Organisation,
Calcutta-1.
197. Central Electronics Engineering
Research Electronics Engineering
Research Institute, Pilani,
Rajasthan.
198. *Central Mechanical Engineering
Research Institute,
Mahatma Gandhi Avenue,
Durgapur-9.
199. *Computer Society of India,
Hyderabad.
200. Berhampur University,
Department of Labour & Social Welfare,
Berhampur-4.
201. Gujarat Vidyapith,
Ashram Road,
Ahmedabad-14.
202. Indian Institute of Management,
Ahmedabad.
203. *Indian Institute of Personnel Management,
(Mysore Branch),
Bangalore-23.
204. Indian Institute of Technology,
(Department of Humanities),
Kharagpur (W. Bengal).
205. *Institute of Tropical Meteorology,
Ramdrug House,
Poona-5.
206. Jabalpur University,
Jabalpur.

207. Orissa University of Agriculture
& Technology,
Bhubaneswar.
208. Saurashtra University,
Dharampur House,
Rajkot.
209. Shri Ram Centre for Industrial Relations,
New Delhi-5.
210. Sri Venkataswara University,
Tirupati (A.P.).
211. Shri Venkateswara University College,
Tirupati (A.P.).
212. Tata Institute of Fundamental Research,
Bombay-5.
213. Thumba Equatorial Rocket Launching Station;
Post Box No. 35,
Trivandrum-1.

IX. Individuals

214. Father A. Fonseca S.J.,
Indian Social Institute,
New Delhi-49.
215. Shri A.N. Singh,
Chief Inspector of Factories,
Bihar.
216. Shri B.B. Tandon,
Department of Economics, Punjab University
Chandigarh.
217. Dr. D. Bright Singh,
Professor of Economics,
Madurai University,
Madurai-2.
218. Professor H.L. Sharma,
Department of Commerce,
Bareilly College,
Bareilly.
219. *Shri J.C. Thaker,
Calico Mills,
Jamalpur Gate, Post Box No. 12,
Ahmedabad.
220. Shri J. L. Dholakia,
Chief, University Employment Bureau &
Reader in Economics, University
School of Social Sciences,
Gujarat University,
Ahmedabad-9.

221. Shri Kalyan Chakraborty,
Economics Department,
P.O. North Bengal University,
District Darjeeling.
222. *Shri M. R. Meher, I.C.S. Retd.
Bombay-25.
223. *Shri Rajani Mukherji,
Calcutta-19.
224. Shri S.D. Punekar,
Professor in Social Sciences,
Tata Institute of Social Sciences,
Bombay-71 AS.
225. Shri S.P. Dube,
Head of the Economics Department,
Awadesh Pratap Singh University,
Rewa (M.P.).
226. Shri S. R. Mohan Das,
Bombay-1 B.R.
227. Dr. Subratesh Ghosh,
Lecturer in Economics,
Jadavpur University,
Calcutta-32.



APPENDIX-VII

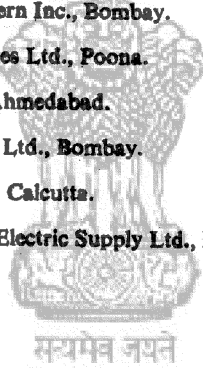
LIST OF ESTABLISHMENTS STUDIED

Public Sector

1. State Bank of India, Bombay.
2. Hindustan Aeronautics Ltd., Bangalore.
3. Indian Telephone Industries Ltd., Bangalore.
4. Central Railway, Bombay.
5. Life Insurance Corporation of India, Bombay.

Private Sector

6. Esso Standard Eastern Inc., Bombay.
7. Kirloskar Oil Engines Ltd., Poona.
8. Calico Mills Ltd., Ahmedabad.
9. Glaxo Laboratories Ltd., Bombay.
10. Bata Shoe Co. Ltd., Calcutta.
11. Bombay Suburban Electric Supply Ltd., Bombay.



APPENDIX-VIII

LIST OF ORGANISATIONS/PERSONS WHO TENDERED
ORAL EVIDENCE BEFORE THE COMMITTEE

I.

Centre
Dates

Ahmedabad
April 27, 1970

1. *Government of Gujarat, Ahmedabad :*
 - (i) Shri M. Sivagnanam —Industries Commissioner.
 - (ii) Shri P. B. Buch —Director, Bureau of Economics and Statistics.
 - (iii) Shri P. V. Swaminathan —Deputy Secretary, Industries, Mines & Power Department.
 - (iv) Shri K. A. Sheth —Deputy Commissioner of Labour.
2. *Textile Labour Association, Ahmedabad and Indian National Chemical Workers' Federation, Ahmedabad :*
 - (i) Shri M. T. Shukla
 - (ii) Shri N. M. Barot
 - (iii) Shri J. C. Desai
 - (iv) Shri V. K. Trivedi
 - (v) Shri B. B. Dave
3. *Electricity Mazdoor Sabha, Ahmedabad :*
 - (i) Shri Babulal Mangal Das Shah
 - (ii) Shri Pratapray Naval Shanker Rawal
 - (iii) Shri Thakore M. Patel
 - (iv) Shri Devandra V. Shah
4. *Ahmedabad Manufacturing & Calico Printing Co. Ltd., (Calico Mills) :*
 - (i) Shri M. V. Bhatt
 - (ii) Shri S. R. Bastkar
 - (iii) Shri B. D. Seriyani
5. *Ahmedabad Electricity Supply Co. Ltd., Ahmedabad :*
 - (i) Shri J. C. Shah
 - (ii) Shri G. V. Kamath
 - (iii) Shri H. C. Patil

6. *Indian Institute of Management, Ahmedabad :*

- (i) Prof. R. J. Mathai
- (ii) Prof. G. R. Kulkarni
- (iii) Dr. N. R. Sheth

7. *The Gujarat Vidyapith, Ahmedabad :*

- (i) Shri Vithal Das M. Kothari
- (ii) Shri Shantilal J. Gandhi

8. *Shri J. L. Dholakia :*

—Chief University Employment
Bureau & Reader in Economics,
School of Social Science, Gujarat
University.

II

Centre
Dates

Bangalore
June 9–11, 1970

1. *Government of Mysore :*

- (i) Shri K. Puttaswami —Minister for Labour & Law
- (ii) Shri M. K. Venkatesan —Secretary, Food, Civil Supplies and Labour.
- (iii) Shri H. L. Nagegowda —Commissioner of Labour
- (iv) Shri Satish Chandran —Director of Industries
- (v) Shri Marichannegowda —Mysore Iron & Steel Ltd.
- (vi) Shri Mir Masoodalli Khan —Deputy Labour Commissioner
- (vii) Shri H. U. Ghodke —Deputy Chief Inspector of Factories

2. *Mysore State Road Transport Corporation :*

- (i) Shri B. J. Gandhi

3. *Hindustan Aeronautics Ltd., Bangalore :*

- (i) AVM A. S. Rikhy
- (ii) Shri N. Rajan

4. *Bharat Electronics Ltd., Jalahalli, Bangalore :*

- (i) Shri N. L. Krishnan

5. *Indian Telephone Industries Employees' Union :*

- (i) Shri M. B. Fernandes
- (ii) Shri V. S. Ramaswamy
- (iii) Shri J. B. Nagaraja
- (iv) Shri C. B. Chandra Shekar

6. *Bharat Earth Movers Ltd., Bangalore :*

- (i) Shri R. L. Kapoor
- (ii) Shri C. V. Nagendra
- (iii) Lt. Col. G. K. K. Iyenger

7. India Government Mint, Hyderabad :

(i) Shri D. C. Mukherjee

8. Mysore State Electricity Board :

(i) Shri M. A. Shariff

(ii) Shri M. A. Narasimha Iyengar

9. National Productivity Council :

(i) Dr. V. Ramachandran

10. The Karnatak Pradesh Trade Union Congress :

(i) Shri M. S. Krishnan

(ii) Shri U. S. Venkataraman

And

11. Bharat Electronics Employees' Union :

(i) Shri E. K. Raja

(ii) Shri M. S. C. Rao

(iii) Shri S. Arangil

(iv) Shri M. P. Reddy

11. Hindustan Aeronautics Employees' Association, Bangalore :

(i) Shri H. Mahadevan

12. Mysore Chamber of Commerce & Industry, Bangalore :

(i) Shri C. G. Rama Rao

(ii) Shri G. M. Reddy

(iii) Shri M. K. Ramachandra

(iv) Shri R. J. Agarwal

(v) Shri K. S. Krishnamurthy

(vi) Shri S. Arumadri Ram

(vii) Shri D. V. M. Rao

And

All India Manufacturers' Organisation (Mysore Branch), Bangalore :

(i) Shri M. K. Panduranga Setty

(ii) Shri M. S. Kumar

And

The Mysore Textile Mills Association, Bangalore :

(i) Shri Y. N. Gangadhara Setty

13. Kirloskar Electric Co. Ltd., Bangalore :

(i) Shri Ravi L. Kirloskar

(ii) Shri S. G. Ramachandra

14. *Mysore Electrical Industries Ltd :*
 (i) Shri N. G. Jayaram
 (ii) Shri M. Rajasekhar
15. *Senupathy Whiteley & Co. (P) Ltd., Bangalore :*
 (i) Shri B. A. Govindaraj
16. *Motor Industries Co. Ltd., Bangalore :*
 (i) Shri V. N. Gopinath
17. *Indian Institute of Personnel Management (Mysore Branch) :*
 (i) Shri S. S. Nigam
18. *Regional Research Laboratory, Hyderabad :*
 (i) Dr. Asghar Hussain

Centre
Dates

III

Madras
June 12-13, 1970

1. *Government of Tamil Nadu :*

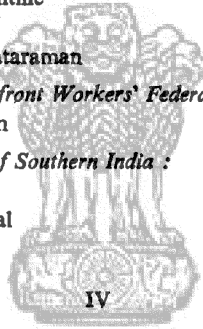
- | | |
|-------------------------------|--|
| (i) Shri V. S. Subbiah | —Labour Secretary |
| (ii) Shri K. R. Radhakrishnan | —Chairman, Electricity Board |
| (iii) Shri C. T. Sreenivasan | —Chief Inspector of Factories |
| (iv) Shri P. M. Vedanarayanan | —Director of Employment and Training. |
| (v) Shri K. M. L. Chhabra | —Director of Industries and Commerce. |
| (vi) Shri E.C.P. Prabhakar | —Secretary, P.W.D. (Incharge) |
| (vii) Shri V. C. C. Menon | —Joint Secretary, Labour Department |
| (viii) Shri M. M. Rajendran | —Labour Commissioner. |
| (ix) Shri G. Kamalaratnam | —Special Deputy Commissioner of Labour. |
| (x) Shri T. V. Ramadoss | —Public Relations Officer, Tamil Nadu Electricity Board. |
| (xi) Shri K. Velayutham | —Accounts Officer, Tamil Nadu Electricity Board. |
| (xii) Shri K. Sengodan | —Assistant Commissioner of Labour |

2. *Southern Railway, Madras and Integral Coach Factory, Perambur :*

- (i) Shri A. Sahul Hamid
 (ii) Shri G. S. A. Saidanha
 (iii) Shri V. Ramanathan
 (iv) Shri R. Narasimham
 (v) Shri M. Sundar Raj

- (vi) Shri S. N. Mathur
 (vii) Shri A. V. Sugavaneswaran
 (viii) Shri S. Ananthanarayanan
3. *Madras Port Trust, Madras and Visakhapatnam Port Trust :*
 (i) Shri L. N. A. Krishnan
 (ii) Shri M. Parthasarathy
 (iii) Shri P. C. Martin
 (iv) Shri R. Srinivasan
4. *Hindustan Photo Films Mfg. Co. Ltd.*
 (i) Shri M. A. S. Rajan
5. *Bharat Heavy Electrical Ltd., Tiruchirapalli :*
 (i) Shri S. Viswanathan
6. *India Pistons Ltd :*
 (i) Shri M. K. Raju
 (ii) Shri N. Venkataramani
 (iii) Shri C. K. Pralahad
7. *Tamilnad Trade Union Congress :*
 (i) Shri K. M. Sundaram
 (ii) Shri K. T. K. Thangamani
 (iii) Shri M. S. Davood
8. *Coordinating Committee of Independent Trade Unions (Southern Zone) :*
 (i) Shri R. V. Krishnamurthy
 (ii) Shri G. Mahadevan
 (iii) Shri A. V. Kumar
9. *Buckingham & Carnatic Mills Staff Union, Madras :*
 (i) Shri Abraham Joseph
 (ii) Shri K. J. Sivaprakasam
 (iii) Shri S. Puroshothaman
10. *Coimbatore District General Workers' Progressive Union :*
 (i) Shri Katoor Gopal
11. *Indian Oil Employees' Union (Southern Branch) and Petroleum Employees' Union :*
 (i) Shri R. M. Sundaram
 (ii) Shri P. Surindran
 (iii) Shri T. S. Rangarajan
 (iv) Shri V. Krishnamoorthy
 (v) Shri M. S. Krishnamoorthi
 (vi) Shri J. Alexander

12. *Estates Staff Union of South India, Coonoor :*
 - (i) Shri K. Rajagopal
 - (ii) Shri C. K. Bhanu
13. *Binny & Buckingham & Carnatic Co. Employees' Union, Madras :*
 - (i) Shri C. Govindarajulu
 - (ii) Shri C. Doraisamy
 - (iii) Shri S. T. Anthony
 - (iv) Shri A. Ganesan
14. *Southern Railway Employees' Union :*
 - (i) Shri C. S. Varadharajan
 - (ii) Shri S. Jesudas
 - (iii) Shri R. Ganapathy
 - (iv) Shri S. L. Constantine
 - (v) Shri S. A. Rasith
 - (vi) Shri U. S. Venkataraman
15. *Port & Dock and Waterfront Workers' Federation of India :*
 - (i) Shri A. Srinivasan
16. *Employers' Federation of Southern India :*
 - (i) Shri N. S. Bhat
 - (ii) Shri A. Venugopal
 - (iii) Shri N. Kannan



Centre
Dates

सत्यमेव जयते

Calcutta
July 6-8, 1970

1. *Government of West Bengal (Labour Department, Commerce & Industry Department):*

(i) Shri A. Bose	—Secretary, C&I Department
(ii) Shri S. R. Das	—Secretary, Labour Department
(iii) Shri A. Choudhury	—Labour Commissioner
(iv) Shri N. Roy	—Additional Labour Commissioner
2. *Indian Oxygen Ltd., Calcutta :*
 - (i) Shri P. C. Basu
 - (ii) Shri S. Rajagopal
3. *Indian Explosives Ltd., Calcutta :*
 - (i) Dr. Subir Chowdhury
4. *United Commercial Bank :*
 - (i) Shri H. R. Srinivasan

5. AITUC, West Bengal State Committee :

- (i) Shri T. N. Siddhanta
- (ii) Shri Bhowani Roy Chowdhary

6. Coordinating Committee of Independent Trade Unions, Eastern Zone Calcutta :

- (i) Shri Rajani Mukherjee

7. Commercial Intelligence Union, Calcutta :

- (i) Shri Samir Lal Mitra
- (ii) Shri Biswaranjan Chakrabarti
- (iii) Shri Birendra Kumar Mittra
- (iv) Shri Dipen Ghosh

8. C.L.W. Labour Union and Eastern Railwaymen's Union :

- (i) Shri N. K. Mukherjee
- (ii) Shri M. Williams
- (iii) Shri S. R. Das
- (iv) Shri Subash Chandra Mitra

9. Committee for United Movement of Workers Employees & Teachers

- (i) Shri Prodyot Kr. Nag
- (ii) Shri Mukvi Mustafi
- (iii) Shri Nirmal Sen Gupta
- (iv) Shri Sukumar Bhattacharyya
- (v) Shri Rajib Khas Tagir
- (vi) Shri Shanti Bhattacharjee
- (vii) Shri Bhabhatosh Roy

10. Indian Chamber of Commerce, Calcutta :

- (i) Shri R. D. Trivedi
- (ii) Shri S. N. Bose
- (iii) Shri A. R. Saraogi
- (iv) Shri D. P. Chakravorti
- (v) Shri A. Bandyopadhyay

11. West Bengal Chamber of Commerce :

- (i) Shri B.K. Nehru
- (ii) Shri R.M. Bhandari
- (iii) Shri S.K. Vohra
- (iv) Shri M. Ghose
- (v) Shri S.N. Bose

12. Bengal National Chamber of Commerce & Industry, Calcutta :

- (i) Dr. B.N. Ghose
- (ii) Shri S.B. Dutt
- (iii) Shri S.N. Bose
- (iv) Shri A. Dutt Gupta
- (v) Shri S.B. Datta

13. Merchants' Chamber of Commerce :

- (i) Shri B.S. Kothari
- (ii) Shri H.L. Somany
- (iii) Shri H.R. Bose
- (iv) Shri B.K. Swalka
- (v) Shri A.R. Kanoria

14. The Engineering Association of India :

- (i) Shri R.D. Trivedi
- (ii) Shri S.S. Chawdhry
- (iii) Shri S.K. Asthana

15 The Indian Engineering Association :

- (i) Shri Sanjoy Sen
- (ii) Shri D.P. Antia
- (iii) Shri D.P. Mukherjee
- (iv) Shri K.V. Varadarajan
- (v) Shri N.R. Srinivasan
- (vi) Shri S.K. Sen
- (vii) Shri K.S. Narasimhan

16. Bharat Chamber of Commerce :

- (i) Dr. B. Mookerjee
- (ii) Shri Om Prakash Tania
- (iii) Shri K.C. Mukherjee

17. Jadavpur University :

- (i) Prof. P.K. Mitra
- (ii) Prof. B. Nag

V

Centre : Jamshedpur
 Dates : July 9-10, 1970

1. Government of Bihar (Labour Department) :

- (i) Shri A.N. Singh — Chief Inspector of Facto
- (ii) Shri L.D. Sinha — Deputy Commissioner
 Labour, Patna.

(iii) Bakshi P.N. Sinha

— Inspector of Factories,
Jamshedpur.

2. *Hindustan Steel Ltd., Ranchi :*

(i) Shri A.K. Pal

(ii) Shri K.K. Swaminath

And

Bokaro Steel Ltd., Bokaro :

(i) Shri K. Ramaswamy

3. *Jamshedpur Chamber of Commerce & Industry :*

(i) Shri R.A. Chachra

4. *TISCO :*

(i) Prof. A.D. Singh

(ii) Shri N.J. Matheas

And

Telco :

(i) Shri A. Chandmal

(ii) Shri M.K. Rustomji

5. *Indian Cable Ltd. :*

(i) Shri V.N. Choopary

6. *Indian Tube Company :*

(i) Shri P. Mitra

7. *Tin Plate Co. of India Ltd. :*

(i) Shri Kirpal Singh

8. *Tata Workers Union :* सत्यमेव जयते

(i) Shri G.V. Gopal

(ii) Shri T. Karamakar

(iii) Shri S.K. Benjamin

(iv) Shri Ratan Singh

(v) Shri V.V.C. Rao

(vi) Shri M.K. Ghosh

Indian Cable Workers' Union :

(i) Shri R.S. Singh

(ii) Shri R.N. Mohanty

VI

Centre : Bombay

Dates : August 19-22, 1970

1. *Government of Maharashtra :*

(i) Shri N.M.T. Tidke

— Labour Minister

- | | |
|-----------------------|---|
| (ii) Shri K.P. Patil | — Minister of State for Labour |
| (iii) Shri S.V. Bhawe | — Secretary, Industries & Labour Department. |
| (iv) Shri B.V. Laud | — Deputy Secretary, Industries and Labour Department. |
| (v) Shri D.G. Kale | — Commissioner of Labour |
| (vi) Dr. V.G. Mhetras | — Professor, Bombay Labour Institute. |

2. *Life Insurance Corporation of India :*

- (i) Shri J.T. Ranadive
- (ii) Shri B.H. Bhukhanwala
- (iii) Shri M.G. Diwan

3. *State Bank of India :*

- (i) Shri S. Swarup

4. *Air India :*

- (i) Shri P. Jayant

5. *Maharashtra Branch of INTUC :*

- (i) Shri A.T. Bhonsle
- (ii) Shri H.N. Trivedi
- (iii) Shri N.S. Deshpande
- (iv) Shri D.S. Salvi
- (v) Shri Raja Kulkarni
- (vi) Shri S.N. Undalkar
- (vii) Miss E.D' Souza
- (viii) Shri S.V. Gole



And

National Federation of Petroleum Workers :

- (i) Shri Raja Kulkarni
- (ii) Shri B.K. Roy Choudhury
- (iii) Shri M.B. Kulkarni
- (iv) Shri B.W. Kulkarni
- (v) Shri R.G. Rane
- (vi) Shri R.V. Sarjotishi

6. *Coordinating Committee of Independent Trade Unions :*

- (i) Shri G.B. Sukhee
- (ii) Shri A.H. Muranjan

7. *All-India Petroleum Workers' Federation :*

- (i) Shri G. Sundaram
- (ii) Shri T.C.S. Mani

8. *Millowners' Association, Bombay :*

- (i) Shri Bhupendra Ratansi
- (ii) Shri D.T.S. Rao
- (iii) Shri R.H. Bengali
- (iv) Shri M.D. Daver
- (v) Shri K.R. Joshi
- (vi) Shri R.L.N. Vijayanagar
- (vii) Shri H.S. Poredi
- (viii) Shri Mahesh Bhogilal

And

The Indian Cotton Mills Federation :

- (i) Shri Bhaskar G. Kakatkar
- (ii) Shri V.T. Tamhane

9. *All-India Manufacturers' Organisation :*

- (i) Shri Ram Agrawal
- (ii) Shri N.D. Sahukar
- (iii) Shri H.P. Merchant
- (iv) Shri P.L. Badami
- (v) Shri K.S. James

10. *Indian Merchants' Chamber :*

- (i) Shri Harish Mahindra
- (ii) Shri J.H. Doshi
- (iii) Shri M.K. Desai

11. *Associated Cement Companies Ltd. :*

- (i) Col. K.R. Coorlawalla
- (ii) Shri S.R. Dolasa
- (iii) Shri A.P. Divecha
- (iv) Shri T.V. Balan
- (v) Shri P.J. Kutar

12. *Bombay Suburban Electric Supply Ltd. :*

- (i) Shri M.R. Bhat
- (ii) Shri S.V. Madgavkar
- (iii) Shri S.S. Thakur

And

B.E.S. & T. Undertaking :

- (i) Shri P.G. Patankar

13. *Kirloskar Oil Engines Ltd., Poona :*

- (i) Shri V.B. Kirtane
- (ii) Dr. B.D. Kanetkar

14. *ESSO Standard Eastern Inc :*

- (i) Shri N. Thakor
- (ii) Shri B.P. Vaidya

15. *Computers Society of India :*

- (i) Shri A. Balasubramanian
- (ii) Shri S.R. Dolasa
- (iii) Dr. R. Narasimhan
- (iv) Shri J.T. Ranadive
- (v) Shri D.P. Medhekar
- (vi) Shri S.S. Rangnekar

16. *Tata Consultancy Services :*

- (i) Shri P.M. Agerwala
- (ii) Shri F.C. Kohli
- (iii) Shri D.N. Maluste
- (iv) Shri A. Malhotra
- (v) Shri Y.P. Sahni

17. *Indian Institute of Management, Ahmedabad :*

- (i) Prof. J.G. Krishnayya

18. *Shri M.R. Meher, I.C.S. (Retd).*

VII

Centre

: Delhi

Dates

: (a) September 10-11, 1970
(b) November 22, 19701. *Railway Board :*

- (i) Shri K.S. Sundararajan — Financial Commissioner, Railway Board.
- (ii) Shri V.R. Ganesan — Director, Accounts, Railway Board.
- (iii) Shri K.P. Taimni — Financial Adviser & Chief Accounts Officer, Northern Railway, New Delhi.
- (iv) Shri V. Panchapagesan — Deputy Director, Statistics, Railway Board.

2. *Department of Statistics (Cabinet Sectt., New Delhi) :*

- (i) Shri V.L. Gidwani

3. *Uttar Pradesh Labour Department :*

- (i) Shri Sheo Pratap Singh — Deputy Labour Commissioner, Kanpur.

(ii) Shri J.P. Khare

— Senior Research Officer,
Office of the Labour
Commissioner, Kanpur.

4. *INTUC :*

- (i) Shri Kesav H. Kulkarni
- (ii) Shri N.K. Bhatt
- (iii) Shri M.R. Sood
- (iv) Shri N. Chakravorty
- (v) Shri H.D. Mukerji

5. *Hind Mazdoor Sabha :*

- (i) Shri Mahesh Desai
- (ii) Shri Hansraj Gulati
- (iii) Shri Hitenarayan Singh
- (iv) Shri Loknath Joshi

6. *All India Railwaymen's Federation :*

- (i) Shri Priya Gupta
- (ii) Shri K.L. Gupta
- (iii) Shri Rakhal Das Gupta

7. *Council of Indian Employers :*

- (i) Shri J.K. Srivastava
- (ii) Shri N.S. Bhat
- (iii) Shri V.G. Rajadhyaksha
- (iv) Shri B.K. Nehru
- (v) Shri Madan Ghose
- (vi) Shri H.S. Singhania
- (vii) Shri B.M. Sethi

8. *Indian Social Institute :*

- (i) Rev. Fr. A. Fonseca, S.J.

9. *IBM World Trade Corporation :*

- (i) Shri G.A. Menon
- (ii) Shri K.R. Singh

10. *International Computers (India) Pvt. Ltd. :*

And

International Computers Indian Manufacture Ltd. :

- (i) Shri S.H. Utam Singh
- (ii) Shri R.V. Subramanian
- (iii) Shri K. Pande
- (iv) Shri A. [Redacted]

11. *All-India Insurance Employees' Association, Calcutta :*

- (i) Shri S. [Redacted]dhuri
- (ii) Shri S. [Redacted]tra
- (iii) Shri T. [Redacted]han

APPENDIX IX
LIST OF COMPUTERS IN INDIA (AUGUST 1971)

Sl. No.	Model & Make	Name of the Organisation	Category*	Year of Installation	Whether a former user of U.R. System
1	2	3	4	5	6
<u>AHMEDABAD</u>					
1.	I.B.M.-1401	Ahmedabad Electricity Co. Ltd., Ahmedabad-1	Private	May, 1967	—
2.	I.B.M.-1401	Ilac Ltd., Services Division, Calico Mills, Ahmedabad-22	Private	July, 1965	U.R.
3.	I.B.M.-1620	Physical Research Laboratory, Ahmedabad-6	R.&D.	Dec., 1962	U.R.
<u>ALIGARH</u>					
4.	I.B.M.-1130	University of Aligarh	R.&D.	Apr., 1971	—
<u>BANGALORE</u>					
5.	I.C.L.-1300	Bangalore Woollen Mills Co. Ltd., Bangalore-23	Private	May, 1966	U.R.

*Category (i) Government Departments (ii) Public Sector Undertakings including Railways (iii) Private Sector Undertakings (iv) Research and Development including Educational Institutions.

1	2	3	4	5	6
6.	I.B.M.-1401(H)	Bharat Earth Movers Ltd., Bangalore 17	Public	Jan., 1970	—
7.	Elliott	Hindustan Aeronautics Ltd., Bangalore-6	Public	Dec., 1971	—
8.	Honeywell	Hindustan Aeronautics Ltd., Bangalore-6	Public	Aug., 1968	—
9.	ICL 1202/1903	Hindustan Machine Tools Ltd., Bangalore-32	Public	1962/1967	U.R.
10.	S/360/44	Indian Institute of Science, Bangalore	R.&D.	May, 1971	—
11.	IBM-1440/IBM-1401	Indian Telephone Industries, Bangalore-16	Public	June, 1966/ June, 1971	U.R.
12.	ICL-1900	International Computers Indian Mfr. Ltd., Private	Private	1971	U.R.
13.	Elliott 920(b)	IRDE, High Grounds, Bangalore	R.&D.	1966/1968	—
14.	FERRANTI SINUS	National Aeronautical Laboratory, Bangalore-6	R.&D.	1967	—
15.	I.B.M.-1401(H)	National Tuberculosis Institute	R.&D.	Feb., 1971	U.R.
BARODA					
16.	ICL-1300	Alembic Chemical Works Ltd.	Private	1969	U.R.

17. I.B.M.-1401	Operations Research Group, Sarabhai Chemicals, Baroda-3	Private	July, 1968	U.R.
<u>BHILAI</u>				
18. I.B.M.-1401	Hindustan Steel Ltd., Bhilai	Public	July, 1967	U.R.
<u>BHUBANESHWAR</u>				
19. I.B.M.-1130	University of Utkal	R. & D.	Apr., 1971	—
<u>BIRMITRAPUR</u>				
20. I.B.M.-1401-H	Bisra Stone Lime	Private	Dec., 1969	
<u>BOKARO</u>				
21. I.B.M.-1401	Bokaro Steel Plant	Public	Oct., 1970	U.R.
<u>BOMBAY</u>				
22. I.B.M.-1460	Air India, Bombay-29	Public	Dec., 1965	U.R.
23. I.B.M.-1401	Associated Cement Co. Limited, Bombay-1	Private	Apr., 1968	U.R.
24. Honeywell-400	Bhabha Atomic Research Centre, Bombay-74	R. & D.	1968	U.R.
25. I.B.M.-1401(H)	Bhor Industries, Bombay	Private	Aug., 1969	U.R.
26. I.B.M.-1401	Bombay Suburban Electric Supply Co., Ltd., Bombay-55	Private	Feb., 1967	U.R.
27. I.B.M.-1401	Bombay Suburban Electric Supply Co., Ltd., Bombay-55	Private	Aug., 1971	Computer

1	2	3	4	5	6
28.	I.B.M.-1401(H)	Bombay Dyeing	Private	Dec., 1970	U.R.
29.	I.B.M.-1620	Bombay University, Bombay-1	R.&D.	Dec., 1964	—
30.	IBM-1460	Burmah Shell Oil Storage & Distributing Co. of India Ltd., Bombay	Private	Dec., 1965	U.R.
31.	IBM-1401	Caltex (India) Limited, Bombay-1	Private	May, 1967	U.R.
32.	IBM-1401	Central Railway, Bombay	Public	Oct., 1969	U.R.
33.	IBM-1401(H)	Empire Dyeing, Bombay	Private	Dec., 1969	U.R.
34.	IBM-1401	Esso Standard Eastern Inc., Bombay	Private	Oct., 1961/ Feb., 1967	U.R.
35.	IBM-1401	Fertiliser Corporation of India	Public	Jan., 1970	U.R.
36.	IBM-1401	Glaxo Laboratories India Ltd., Bombay-18	Private	Oct., 1967	U.R.
37.	ICL-1900	Godrej & Boyce Mfg. Co. Pvt. Ltd.	Private	1971	U.R.
38.	IBM-1401	I.B.M. Factory, Bombay-72	Private	Feb., 1967	—
39.	IBM-1401	I.B.M. Service Bureau, Bombay	Private	Nov., 1966	—
40.	Minisk-II	Indian Institute of Technology, Bombay	R.&D.	Dec., 1967	—
41.	IBM-1401	ILAC	Private	Dec., 1970	U.R.

42.	IBM-1401(H)	.	Johnson & Johnson Ltd., Bombay	.	Private	May, 1969	U.R.
43.	IBM-1401(H)	.	Khatu Mills	.	Private	May, 1971	—
44.	IBM-1401	.	Life Insurance Corporation of India, Bombay, Central Office.	.	Public	Nov., 1969	U.R.
45.	IBM-1410	.	Life Insurance Corporation of India, Bom- bay, Central Office	.	Public	Nov., 1965	U.R.
46.	ICL-1900	.	Maharashtra State Road Transport	.	Public	1971	U.R.
47.	IBM-1401	.	Philips India Ltd., Bombay-18	.	Private	Dec., 1966	U.R.
48.	IBM-1401	.	Premier Automobile Ltd., Bombay	.	Private	Nov., 1968- 1969	U.R.
49.	Honeywell-400	.	Reserve Bank of India, Bombay-7	.	Public	Sept., 1968	—
50.	IBM-1401	.	State Bank of India, Bombay-18	.	Public	Dec., 1966	U.R.
51.	ICL-1300	.	Swan Mills Ltd., Bombay	.	Private	1969	U.R.
52.	IBM-1401	.	Tata Computer Centre Consultancy Servi- ces, Bombay-1	.	Private	Sept., 1967	U.R.
53.	ICL-1903	.	Tata Computer Centre Consultancy Ser- vices, Bombay-1	.	Private	1971	Computer
54.	CDC-3600 100 A	.	Tata Institute of Fundamental Research, Bombay-75	.	R. & D.	June, 1964	—
55.	IBM-1401	.	Tata Sons Pvt. Ltd., Bombay-1	.	Private	Mar., 1971	—
56.	IBM-1401	.	Western Railway, Bombay	.	Public	Nov., 1967	U.R.

1	2	3	4	5	6
		BULSAR			
57.	IBM-1401(H)	 Atul Products	 Private	Feb., 1971	—
		CALCUTTA			
58.	IBM-1401	 Bata Shoe Co. Pvt. Ltd., Calcutta-16	 Private	Jan., 1966	U.R.
59.	IBM-1401	 Director General of Ordnance Factories, Calcutta-16	 Govt.	Apr. 1964/ Apr., 1968	U.R.
60.	IBM-1401	 Dunlop India Ltd., Sahaganj, Calcutta	 Private	Jan., 1967	U.R.
61.	IBM-1401	 Eastern Railway, Calcutta-1	 Public	July, 1968	U.R.
62.	IBM-1401	 Hindustan Motors Ltd., Uttarpara, Calcutta	 Private	July, 1966	U.R.
63.	IBM-1401	 IBM Service Bureau, Calcutta	 Private	July, 1966	—
64.	ICL-1300	 Indian Oxygen Ltd., Calcutta-53	 Private	Apr., 1969	U.R.
65.	Honeywell-400	 Indian Statistical Institute, Calcutta-35	 R. & D.	July, 1964	U.R.
66.	ISIJU	 Jadavpur University, Telecommunication Department, Calcutta-32	 R. & D.	July, 1964	—
67.	IBM-1401	 Joint Plant Committee, Calcutta-1	 Public	Mar., 1966	—
68.	IBM-1130	 Kuljian Corpn., Calcutta	 Private	Jan., 1969	—

69. IBM-1401(H) . . . New Central Jute Mills, Calcutta. Private Mar., 1969 —
 70. IBM-1401 . . . South Eastern Railway, Calcutta. Public Jan., 1968 U.R.
 71. IBM-1401 . . . Union Carbide India Ltd., Calcutta-16. Private Apr., 1965 U.R.

CHANDIGARH

72. IBM-1620 . . . Mathematics Department, University of Punjab, Chandigarh. R & D Dec., 1965 —

CHITTARANJAN

73. IBM-1440 . . . Chittaranjan Locomotive Works, Chittaranjan. Public June, 1966 —
 74. IBM-1401(H) . . . Fertilisers & Chemicals, Travancore, Cochin. Public Aug., 1971 U.R.

DEHRADUN

75. Honeywell-400 . . . Oil & Natural Gas Commission, Dehradun. Public Feb., 1969 —

DIGBOI

76. ICL-1901 . . . Assam Oil Co. Ltd., Digboi. Private Oct., 1968 U.R.

DURGAPUR

77. IBM-1620 . . . Central Mechanical Engg. Research Institute, Durgapur. R & D Mar., 1966 —

1	2	3	4	5	6
78.	IBM-1401 .	. . Hindustan Steel Ltd., Durgapur	Public	Oct., 1968	U.R.
<u>GHATSILA</u>					
79.	IBM-1401(H)	. . Indian Copper Corporation.	Private	Aug., 1969	—
<u>GORAKHPUR</u>					
80.	IBM-1401 .	. . North Eastern Railway, Gorakhpur	Public	July, 1969	U.R.
<u>HYDERABAD</u>					
81.	IBM-1620 .	. . Defence Research & Development Laboratory, Chandrayanagutta, Hyderabad.	R & D	Mar., 1963	—
82.	IBM-1401(H)	. . Electronic Corporation of India Ltd., Hyderabad-40.	Public	Feb., 1969	—
83.	IBM-1401(H)	. . Hindustan Aeronautics Limited	Public	May, 1971	U.R.
84.	IBM-1401(H)	. . Nizam Sugar Factory, Nizamabad	Public	Nov., 1968	—
85.	IBM-1620 .	. . Regional Research Laboratory, Hyderabad-9	R & D	Aug., 1966	—
86.	IBM-1401 .	. . South Central Railway, Secunderabad	Public	Jan., 1969	U.R.
<u>INDORE</u>					
87.	IBM-1401(H)	. . Hukam Chand Mills	Private	Mar., 1971	U.R.

JAMSHEDPUR

88. IBM-1401 . . .	Tata Engg. & Locomotive Co. Ltd., Jamshedpur.	Private	Feb., 1965	U.R.
89. IBM-1401 . . .	Tata Engg. & Locomotive Co. Ltd., Jamshedpur.	Private	Aug., 1968	—
90. IBM-1401 . . .	Tata Engg. & Locomotive Co. Ltd., Jamshedpur.	Private	Jan., 1971	—
91. IBM-1401 . . .	Tata Iron & Steel Co. Ltd., Jamshedpur.	Private	Sep., 1967	U.R.
92. IBM-1401 . . .	Tata Iron & Steel Co. Ltd., Jamshedpur.	Private	Dec., 1968	—

KANPUR

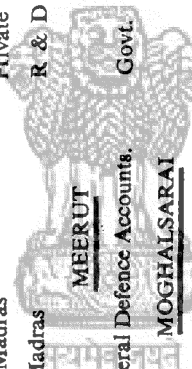
93. IBM-1629 . . .	Indian Institute of Technology, Kanpur.	R & D	Nov., 1963	—
94. IBM-7044 . . .	Indian Institute of Technology, Kanpur.	R & D	July, 1966	—
95. IBM-1401-(H) . . .	Indian Institute of Technology, Kanpur.	R & D	Aug., 1968	—
96. IBM-1401-H . . .	Swadeshi Mills	Private	Nov., 1970	—

KHARAGPUR

97. IBM-1620 . . .	Indian Institute of Technology, Kharagpur	R & D	July, 1964	—
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MADRAS

98. ICL-1300/ICL-1900 . . .	Binny Limited, Madras.	Private	Apr., 1965/ 1971	U.R.
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1	2	3	4	5	6
99.	IBM-1620 .	. Engineering College, Guindy, Madras	R & D	Nov., 1964	—
100.	IBM-1401 .	. IBM Service Bureau, Madras	Private	Sep., 1968	—
101.	IBM-1401 .	. Integral Coach Factory, Madras-30	Public	Nov., 1966	U.R.
102.	IBM-1401 .	. Southern Railway, Madras	Public	Nov., 1967	U.R.
103.	IBM-1401 .	. H.T.I. Cycles, Madras	Private	Aug., 1970	U.R.
104.	IBM-1130 .	. University of Madras	R & D	May, 1968	U.R.
 MEERUT MOGHALSARAI					
105.	IBM-1401(H)	. Controller General Defence Accounts.	Govt.	Nov., 1969	—
NEW DELHI					
106.	IBM-1401(H)	. Marshalling Yard, Moghalsarai.	Public	July, 1969	—
NEW DELHI					
107.	IBM-1401 .	. Bellarpur Paper Mills	Private	June, 1971	—
108.	IBM-1401 .	. Delhi Cloth & General Mills, Delhi	Private	Aug., 1968	U.R.
109.	IBM-1620 .	. Delhi School of Economics, Delhi-7	R & D	July, 1965	—
110.	IBM-1620 .	. Delhi University (Physics Deptt.), Delhi	R & D	Nov., 1963	—
111.	S/360/44 .	. Delhi University	R & D	May, 1971	—
112.	Honeywell-400 .	. Govt. Computer Centre, New Delhi	Govt.	Oct., 1967	—

113.	Honeywell-400	. Govt. Computer Centre, New Delhi	Govt.	Oct., 1967	—
114.	Honeywell-400	. Govt. Computer Centre, New Delhi	Govt.	Oct., 1967	—
115.	IBM-1401	. I.B.M. Service Bureau, New Delhi	Private	Aug., 1967	—
116.	IBM-1401	. Indian Airlines, New Delhi	Public	Dec., 1966	U.R.
117.	ICL-1909	. Indian Institute of Technology, New Delhi	R & D	Sep., 1967	—
118.	IBM-1620	. Institute of Agricultural Research Statistics, New Delhi-12	R & D	Feb., 1965	U.R.
119.	Honeywell-400	. Joint Cipher Bureau, New Delhi	Govt.	Jan., 1969	—
120.	S/360/30	. Military Intelligence, New Delhi	Govt.	Mar., 1970	U.R.
121.	IBM-1401	. Northern Railway, New Delhi	Public	Apr., 1967	U.R.
122.	IBM-1620	. Programme Evaluation Organisation, Planning Commission, New Delhi	Govt.	Aug., 1965	—
123.	IBM-1401	. Railway Board, New Delhi	Public	Nov., 1968	—
124.	IBM-1401	. Registrar General of Census, New Delhi	Govt.	Oct., 1966	—
125.	ICL-1904	. Signal Directorate	Govt.	1971	—
126.	Elliott-803	. Telecommunication Research Centre, (TRC) New Delhi	R & D	June, 1965	—
<u>PANDU</u>					
127.	IBM-1401	. North East Frontier Railway.	Public	Jan., 1970	U.R.
<u>PILANI</u>					
128.	IBM-1130	. Birla Institute of Technology, Pilani.	R & D	Aug., 1969	—

1	2	3	4	5	6
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POONA

129.	Honeywell-400	Armament Research & Development Establishment, Poona-3	R & D	1968	—
130.	IBM-1620	Institute of Tropical Meteorology, Poona-5	R & D	Feb., 1964	U.R.
131.	ICL-1902	Kirloskar Oil Engines, Poona	Private	Nov., 1967	U.R.
132.	IBM-1401	TELCO	Private	Apr., 1971	U.R.
133.	IBM-1620	Structural Engineering Research Centre, Roorkee	R & D	June, 1964	—
134.	IBM-1401	Hindustan Steel Ltd., Rourkela	Public	June, 1968	U.R.

TRIVANDRUM

135.	Minsk-II	Thumba Equatorial & Rocket Launching Station, Thumba, Trivandrum	R & D	Feb., 1965	—
136.	IBM-1620	Space Science & Tech. Centre, Thumba	R & D	Feb., 1971	U.R.

VARANASI

137. IBM-1401 . . . Diesel Locomotive Works, Varanasi . . . Public . . . July, 1968 . . . —

VISAKHAPATNAM

138. IBM-1401(H) . . . Bharat Heavy Plates . . . Public . . . June, 1971 . . . U.R.

139. IBM-1401(H) . . . Hindustan Shipyard . . . Public . . . Nov., 1970 . . . —

WALTTIAR

140. IBM-1130 . . . University of Andhra . . . R & D . . . Apr., 1971 . . . —

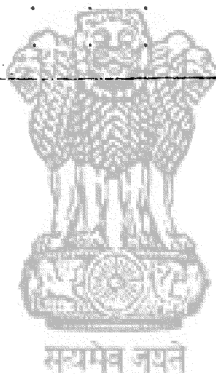
NOTE :—This list excludes the following organisations which had installed computers but surrendered them during 1970-71 :

- (1) Binod Mills, Ujjain, IBM-1401(H) (Installed in May, 1969).
- (2) Indian Statistical Institute, Calcutta, IBM-1401 (Installed in July, 1964).
- (3) Ahmedabad Textile Industrial Research Association, Ahmedabad, IBM-1620 (Installed in April, 1966).
- (4) Burn & Co., Calcutta, ICL-1202 (Installed in 1965).

APPENDIX—X

Growth of Computer Installations in some Foreign Countries :

Country	1957	1967	1969
1	2	3	4
U.S.A.	—	—	76,812 (1-10-70)
U.K.	75	2,105	5,000
West Germany	20	3,663	6,400
France	15	N.A.	4,803
Japan	—	2,411	4,577
Italy	10	1,750	2,300



APPENDIX—XI

Computers in India

State-wise and Sector-wise

Sl. No.	Name of the State/ City	Govt. De- part- ments	Public Sector Under- takings includ- ing Rail- ways	Private Sector Under- takings	Research & Devel- opment includ- ing Educa- tional Institu- tions	Total
1	2	3	4	5	6	7
1. Assam :						
(i)	Digboi	—	—	1	—	} 2
(ii)	Pandu	—	1	—	—	
2. Andhra Pradesh :						
(i)	Hyderabad	—	4	—	2	} 9
(ii)	Visakhapatnam	—	2	—	1	
(iii)	Waltair	—	—	—	—	
3. Bihar :						
(i)	Bokaro	—	1	—	—	} 7
(ii)	Ghatsila	—	—	1	—	
(iii)	Jamshedpur	—	—	5	—	
4. Gujarat :						
(i)	Ahmedabad	—	—	2	1	} 6
(ii)	Baroda	—	—	2	—	
(iii)	Bulsar	—	—	1	—	
5. Kerala :						
(i)	Cochin	—	1	—	—	} 3
(ii)	Trivandrum	—	—	—	2	

1	2	3	4	5	6	7
6. Madhya Pradesh :						
(i) Bhilai	.	.	—	1	—	—
(ii) Indore	.	.	—	—	1	—
						} 2
7. Maharashtra :						
(i) Bombay	.	.	—	9	22	4
(ii) Poona	.	.	—	—	2	2
						} 39
8. Mysore :						
(i) Bangalore	.	.	—	5	2	4
						11
9. Orissa :						
(i) Birmitrapur	.	.	—	—	1	—
(ii) Bhubaneshwar	.	.	—	—	—	1
(iii) Rourkela	.	.	—	—	—	—
						} 3
10. Punjab :						
(i) Chandigarh	.	.	—	—	—	1
						1
11. Rajasthan :						
(i) Pilani	.	.	—	—	—	1
						1
12. Tamil Nadu :						
(i) Madras	.	.	—	2	3	2
						7
13. Uttar Pradesh :						
(i) Aligarh	.	.	—	—	—	1
(ii) Dehradun	.	.	—	1	—	—
(iii) Gorakhpur	.	.	—	1	—	—
(iv) Kanpur	.	.	—	—	1	3
(v) Meerut	.	.	1	—	—	—
(vi) Moghalsarai	.	.	—	1	—	—
(vii) Roorkee	.	.	—	—	—	1
(viii) Varanasi	.	.	—	1	—	—
						} 11
14. West Bengal :						
(i) Calcutta	.	.	1	3	8	2
(ii) Chitranjan	.	.	—	1	—	—
(iii) Durgapur	.	.	—	1	—	1
(iv) Kharagpur	.	.	—	—	—	1
						} 18
15. Delhi						
	.	.	8	3	3	6
						20
GRAND TOTAL			10	39	55	36
						140

APPENDIX—XII

Computers in India

Classified according to industries

Sl. No.	Name of the Industry	Number of Computers				Total
		Government Departments	Public sector undertakings including Railways	Private sector undertakings	Research & Development including Educational Institutions	
1	2	3	4	5	6	7
1.	Air Transport	—	2	—	—	2
2.	Automobile	—	1	3	—	4
3.	Cement & Stone Lime	—	—	2	—	2
4.	Chemicals & Chemical Products	—	2	6	—	8
5.	Electric Supply	—	—	3	—	3
6.	Engineering including Iron & Steel	—	15*	9	—	24
7.	Banking & Insurance	—	4	—	—	4
8.	Petroleum	—	1	4	—	5
9.	Railways	—	11	—	—	11
10.	Textiles	—	—	13	—	13
11.	Others	—	3	8	—	11
TOTAL		—	39	48	—	87
12.	Service Bureaux	—	—	7	—	7
13.	Government Departments	10	—	—	—	10
14.	Research & Development	—	—	—	36	36
GRAND TOTAL		10	39	55	36	140

*Integral Coach Factory, Chittaranjan Locomotive Works and Diesel Locomotive Works are included in this Group.

APPENDIX—XIII

Statement showing Important Computer Applications & the Number of Organisations which have Computerised them

Applications	Number of Units		
	Public Sector	Private Sector	Total
1	2	3	4
1. Inventory control/Stores Accounting	16	18	34
2. Pay roll accounting	15	16	31
3. Financial accounting	5	18	23
4. Production control and planning	6	10	16
5. Sales Statistics	2	10	12
6. Costing	6	5	11
7. Billing/Invoicing	2	7	9
8. Management Information Service	3	8	11
9. Traffic/Freight accounting	9	—	9
10. Research & Development including PERT	1	5	6
11. Wagon Movement	2	—	2
12. Linear Programming	—	2	2
13. Design calculations	1	—	1
14. Reconciliation	1	—	1

APPENDIX—XIV

STATEMENT

Motivation or installing computer (Industry-wise)

Sl. No.	Motivation for installing the computer	Textiles	Engineering	Engineering including Iron & Steel	Cement	Chemicals & Chemical products	Oil Refineries (Petroleum)	Electric supply	Air Transport	Railways	Banking	Others	Number of Units		
													Public	Private	Grand Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1.	Improvement of quality of product/service	2	9	1	1	4	2	2	11	1	3	20	16	36	
2.	Reduction of time-lag in tabulation and analysis of data	3	9	1	2	4	2	1	11	2	2	19	18	37	
3.	Facilitate Management decision-making	2	9	1	2	4	2	2	11	1	2	19	17	36	
4.	Increase in output	2	8	1	1	2	2	—	11	—	2	15	14	29	
5.	Facilitate scientific research and development	1	3	1	1	3	—	—	—	1	2	—	12	12	
6.	Reduction of labour cost	1	2	—	—	—	1	—	—	1	—	2	3	5	

Total Number of Respondents : 40.

APPENDIX — XV

Statement Showing the Estimated Loss of Potential Employment in three Selected Establishment

ESTABLISHMENT A :

Item of Work	Before computerisation		After computerisation		Estimated employment if the volume of work in Col. 4 was done with old system	
	November, 1966		January, 1970			
	Volume of work (entries per day)	No. of employees	Volume of work (entries per day)	No. of employees		
1	2	3	4	5	6	
(1) Branch Clearance	.	50,000	299	70,000	221	419
(2) Government Accounts	.	12,500	81	15,000	83	97
			380		304	516

ESTABLISHMENT B :

Application		Before computerisation September, 1966		After computerisation January, 1970				
	U.R. or Manual	Volume of work	No. of employees	Volume of work	No. of employees working	Estima- ted man- power require- ment if work was done on Col. 7 old system	Poten- tial Loss (-) gain (+) employ- ment —Col. 6	
1	2	3	4	5	6	7	8	
Stores, Inventory control including ABC, EOQ	Partly UR partly manual	15,000 transac- tions	25	20,000	21.	27	6	
Payroll and Time-keeping	Manual	1,398 employees	14	1,554	16	14	-2	
Billing	UR for non-in- dustrial	184,000 Bills	95	256,000	96	105	9	
Costing Defaulting consumers' list	Manual UR	602 jobs 184,000	12 4	815 256,000	15 3	15 4	— 1	
			150		151	165	14	

ESTABLISHMENT C :

Nature of application	Before computerisation		After computerisation		Estimated manpower if present work was done on old system		Potential loss/gain of employment
	Volume of work	No. of employees working	Volume of work	No. of employees working	manpower if present work was done on old system		
1	2	3	4	5	6	7	
Premium and loan interest billing	81,000 items	700 man-hours	1,15,471 items	560 man-hours	840 man-hours	280 man-hours	
Renewal commission & Bonus commission.	3.75 lakh entries	4,900 man-hours	4.40 lakh entries	1,820 man-hours	5,600 man-hours	3,780 man-hours	
Premium loan & commission accounting	74,000 units	2,940 man-hours	1,18,233 units	3,640 man-hours	3,841 man-hours	201 man-hours	
Business Statistics	—	840 man-hours	—	1,400 man-hours	840 man-hours	—560	

APPENDIX—XVI

Secretariat of the Committee (as on 1st March, 1971)

Secretary

Shri M.A.M. Rao

Deputy Director

Dr. (Miss) Kamla Mathur

Assistant Directors

Shri B.N. Kacker

Shri Manohar Lal

Shri M.C. Jain

Shri G.R. Gupta

Investigators Grade I

Shri R.K. Puri

Shri R.K. Singh

Shri K.S. Lal

Investigators Grade II

Shri Jagan Mohan

Shri S.S. Bhasin

Shri D.S. Bammi

Shri I.S. Hora

Shri R.C. Sharma

Stenographers

Shri K.G. Krishnan

Shri Jagat Singh

Shri K.G. Vazirani

Miss Usha Sharma

Computer

Shri V.K. Jain

Administrative Officer

Shri R.P. Narula

Superintendents

Shri B.L. Sharma

Shri Shiv Kishore

Assistants

Shri D.V.S. Saharavat

Shri R.C. Kondal

Accountant

Shri M.L. Bhatia

UDC-cum-Cashier

Shri B.K. Sharma

Lower Division Clerks

Shri R.L. Tulsiani

Shri Puran Chand

Shri Ashok Kumar Kapur

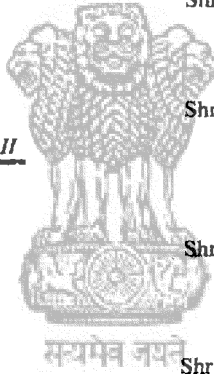
Peons

Shri N.P. Juyal

Shri Sharad Chand

Shri Charan Singh

Shri Manmohan Lal



Staff Car Driver

Shri Son Nath

Farash-cum-Chowkidar

Shri Birkha Ram

Gestener Operator

Shri Bhopal Singh

Sweeper

Shri Amar Singh

Daftary

Shri Hirdey Ram

